

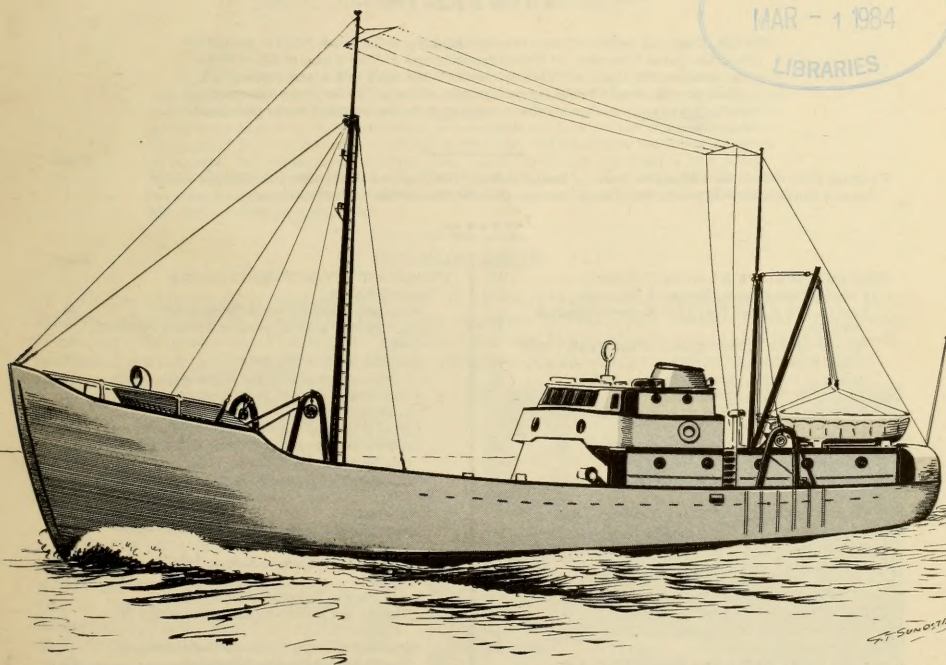
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ROBERT H GIBBS JR

# COMMERCIAL FISHERIES REVIEW

## DEEP-SEA TRAWLER

ATLANTIC  
126 Feet in length



Vol. 16, No. 8

AUGUST 1954

FISH and WILDLIFE SERVICE  
United States Department of the Interior  
Washington, D.C.



# COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries  
prepared in the BRANCH OF COMMERCIAL FISHERIES



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## FREEZING FISH AT SEA -- NEW ENGLAND

### Part 8 - Some Factors Affecting the Salt (Sodium Chloride) Content of Haddock During Brine-Freezing and Water-Thawing

By J. Holston\* and S. R. Pottinger\*\*

#### ABSTRACT

A study of the penetration of salt into fish during brine-freezing was made in connection with the U. S. Fish and Wildlife Service's study of the commercial feasibility of freezing fish at sea aboard the experimental trawler Delaware. Penetration of salt was found to be influenced by the temperature, concentration, and composition of the sodium chloride brine; by the length of time the fish were immersed in the brine; and by whether the fish were gutted or ungutted. Salt penetration occurring under routine operations was found to be a minor factor, and salt was shown to be leached from the fish during water thawing. Salt content of the meat directly under the skin was shown, after water thawing, to be below the taste threshold (0.5 percent) for salt in fish.

#### INTRODUCTION

In the course of a continuing study of the feasibility of freezing fish at sea, the Boston laboratory of the U. S. Fish and Wildlife Service has investigated immersion freezing (Magnusson, Pottinger, and Hartshorne 1952) of the fish aboard the experimental trawler Delaware. The frozen fish are water-thawed prior to commercial processing into fillets. Results to date with round (uneviscerated) fish indicate that this method of freezing is commercially feasible. A recent and thorough review of the study has been reported by Puncochar and Pottinger (1953).

In the formative stages of the freezing-at-sea project, there was some question as to whether the freezing by immersion in cold sodium-chloride brines might be objectionable from the standpoint of possible excessive penetration of the salt into the meat of the fish. Studies by various investigators (Plank, Ehrenbaum, and Reuter 1916; Almy and Field 1921; and Stiles 1922) have indicated that with proper procedures the amount of salt penetrating into the meat can be controlled. Preliminary work along these lines at the Boston laboratory confirmed these findings. Later, this

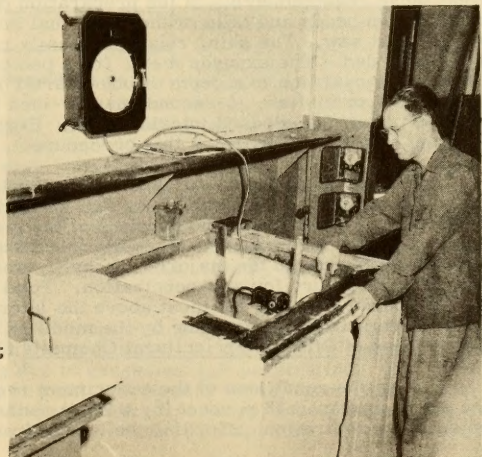


Fig. 1 - Experimental freezing tank.

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laboratory initiated a detailed study of the various factors governing the penetration of salt into fish during the immersion-freezing process. The study was to serve as a guide in the development of suitable procedures for the immersion-freezing of certain varieties of groundfish native to the Northwestern Atlantic Ocean.

The following major factors governing the penetration of salt into the meat during immersion-freezing of fish were selected from the studies conducted at the Boston laboratory and will be reported on here:

1. The effect of brine temperature.
2. The effect of brine concentration.
3. The effect of immersion time.
4. The effect of brine composition.
5. The effect of evisceration of fish prior to freezing.
6. Salt penetration during unsupervised semicommercial operations.
7. The leaching of penetrated salt during the water-thawing process.

The penetrated salt content in brine-frozen fish and in brine-frozen and water-thawed fish will be discussed in terms of taste thresholds and tolerances for salt in fish.

### EXPERIMENTAL

A study of the published literature on the penetration of salt into fish during immersion-freezing in sodium-chloride brines indicated that sample control was of paramount importance for reproducibility of results. Replicate values of salt content, in some cases, varied by as much as 200 to 300 percent (Almy and Field 1921). Preliminary work at this laboratory, which showed variations in replicate values of some 40 to 50 percent, confirmed the necessity for sample control. On the basis of this preliminary work and to fulfill the requirements for which the study was initiated, a reproducibility of  $\pm 20$  percent was deemed necessary.

A precise and reproducible method of sampling the frozen fish was developed to meet these requirements. In the preparation of samples for determination of salt content, the heads and tails of the individual brine-frozen haddock were removed with a meat saw. The skin, relatively easily removed by hand from the frozen fish, was discarded. The exposed meat, from pectoral fin to tail and between the lateral lines and dorsal line to a depth of one-quarter inch, was very carefully cut from the still semifrozen fish. A second quarter-inch layer, identical to the first, was then removed from the exposed interior meat. Figure 2 by means of a cross-sectional drawing of a fish illustrates this procedure.

Six strips of meat, of the same depth level, from three fish were grouped to form one sample. The sample was then ground in a meat grinder, mixed thoroughly by hand, and reground. Two portions of the ground meat, of about 10 grams each, were removed for analyses. The salt content of three such samples, in good quantitative agreement in the majority of cases, was averaged to give a relatively stable, reproducible figure for salt penetration. Total salt content was determined on samples prepared from all the meat above the lateral lines as illustrated in figure 2. Salt determinations were made by the modified Volhard titration procedure of the Association of Official Agricultural Chemists (1950).

Unless the conditions of the experiment required otherwise, all brines used in the study contained 23 percent (by weight) sodium chloride. Such a solution is of the eutectic concentration, affording the lowest freezing point ( $-6^{\circ}$  F.) that is possible



with sodium-chloride solutions. The total salt content of trawl-caught gutted haddock, stored in ice, was found to range from 0.13 to 0.17 percent.

**BRINE TEMPERATURE AND CONCENTRATION:** To study the effects of brine temperature, of brine concentration, and of length of immersion periods on salt penetration, a portable immersion freezer developed at this laboratory was used (Oldershaw, Holston, and Pottinger 1953). The relatively small quantities of brine (150 pounds) used in the freezer and the ease with which the temperature of the brine could be controlled facilitated study of the different factors governing salt penetration. Round haddock of known history were frozen in brine at  $-6^{\circ}$ ,  $0^{\circ}$ ,  $5^{\circ}$ ,  $10^{\circ}$ , and  $15^{\circ}$  F., at sodium-chloride concentrations of 15 and 23 percent. They were held in the brine for periods of time up to 24 hours.

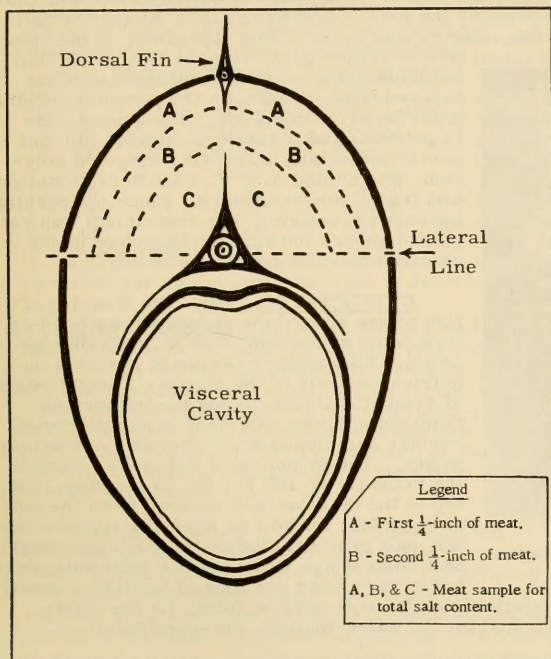


Fig. 2 - Cross-section of haddock showing portions of meat removed for salt analyses.

hours dead), carefully iced, undamaged, round haddock were chosen for the experiment. They were rinsed to remove slime and debris, and were individually tagged for sample identification. The fish were separated into groups of three, and each group was weighed. The fish were then immersed in a cold ( $5^{\circ}$  F.) sodium-chloride (23 percent) brine. The brine was agitated by a sump pump, and the temperature was controlled by a thermostat. The usual variation in temperature was about  $\pm 1^{\circ}$  F., with two short periods when the temperature dropped to about  $+2^{\circ}$  F. A group of three fish was removed at the end of the first, second, fourth, sixth, eighth, tenth, and twelfth day.

Upon removal from the brine, the fish comprising a particular group were washed and weighed. Each fish was cut in cross-section at the point of maximum girth and examined for evidence of thawing due to excessive salt penetration. The extent of thawing, evidenced by a dark ring of meat surrounding white, hard-frozen meat, was measured. The fish were then wrapped in kraft paper to retard desiccation and stored in a cold ( $-20^{\circ}$  F. ambient temperature) box. Subsequently, determinations

#### IMMERSION PERIOD:

The observed continuation of salt penetration into the fish throughout an immersion period of 24 hours appeared to conflict with reports from the West Coast (private communication) concerning the prolonged immersion of salmon and tuna in cold ( $5^{\circ}$  F.) sodium-chloride brines without undue penetration of salt into the fish. An experiment was therefore conducted to test the degree and rate of penetration of salt into fish during a two-week immersion in cold brine. Fresh (less than 24

of penetrated salt, of total salt, and of moisture changes in the meat due to salt penetration were made.

**BRINE COMPOSITION:** Hober (1945) reports the results of many investigations of the "solubilizing" of animal membranes by pure sodium-chloride solutions and also the prevention of such action by the addition of small quantities of calcium and magnesium salts. Tressler (1920) and Taylor (1921) refer to similar effects of calcium and magnesium salts in retarding the rate of salt penetration during the salting of fish. In line with this work, a study was made at this laboratory of the effect of a variation in the composition of sodium-chloride brine on salt penetration into immersed fish. A eutectic (23 percent) sodium-chloride brine containing calcium chloride (1 percent) and potassium chloride (0.6 percent), essentially a fortified Ringer's solution, was cooled to 5° F. Fish were immersed and frozen for 90 minutes. Since the results appeared promising, the experiment was repeated aboard the trawler *Delaware* under semicommercial conditions at sea.

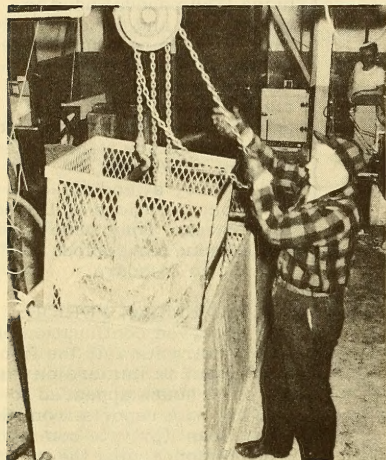


Fig. 3 - Hoisting defrosted round fish from the thawing tank.

**EVISERATED FISH:** The freezing of fish at sea aboard the *Delaware* has been performed on round fish, that is, with the viscera intact. To provide answers to possible inquiries, a study of the changes in salt content of eviscerated fish during the immersion-freezing process was made in the course of regular semicommercial freezing operations at sea. The eviscerated fish were frozen in the brine (5° to 10° F.) for 90 minutes. Owing to the fact that salt entered from the outside surface as well as from the visceral cavity, salt gradient studies were not practical. Salt content was expressed as total salt present in particular portions of the fish, namely:

- (1) the full-nape fillet, (2) the quarter-nape or commercial fillet, (3) the collar,
- (4) the nape, (5) the tail portion, and (6) the water-thawed, full-nape fillet.

**SALT CONTENT OF COMMERCIALY BRINE-FROZEN AND OF BRINE-FROZEN AND WATER-THAWED FISH:** Several large random samples of haddock and of scrod haddock frozen at sea with only superficial supervision, were removed from various lots of frozen fish before and after routine water-thawing processing. The large haddock and the scrod haddock had been immersed in the cold (5° to 8° F.) eutectic brine for 180 minutes and for 90 minutes, respectively. These immersion periods have been found to fit conveniently into the normal routine of operations aboard the trawler. The conditions of the water thawing, insofar as was practical for large quantities of fish, were standardized. Temperature of the thawing water was maintained at 60° F. The water was agitated by means of a motor-driven propeller. The scrod were immersed in the thawing water for 120 minutes and the haddock for 200 minutes. The thawed samples were immediately refrozen in a plate freezer (-20° F., ambient temperature) to insure that salt remaining in the meat did not diffuse throughout the fish. Salt gradient studies were performed on 6 samples of 3 fish each, of both the brine-frozen (before water thawing) and brine-frozen and water-thawed scrod haddock and haddock.



## RESULTS AND DISCUSSION

**BRINE TEMPERATURE:** The effect of brine temperature upon salt penetration into fish during an immersion-freezing process is shown in table 1. A graded increase in salt content in the first quarter-inch of meat, with increase of brine temperature, is observed. The increase in salt content of the second quarter-inch of meat in all cases

Table 1 - Variation in Salt Content of the Meat of Round Scrod Haddock Immersed for One Hour in Sodium-Chloride (23 percent) Brine at Different Temperatures

Brine Temperature	Salt Content	
	In 1st $\frac{1}{4}$ -inch of Meat	In 2nd $\frac{1}{4}$ -inch of Meat
	Percent	Percent
-6	0.37	0.15
0	0.51	0.19
5	0.55	0.24
10	0.64	0.23
15	1.15	0.24

is slight and is well below the taste threshold (0.5 to 0.6 percent--unpublished data) for salt in fish. The increase in salt content in the first quarter-inch of meat evidences serious differences only when considered in relation to freezing rates at the differing brine temperatures. Fish immersed for one hour at -6° F. are wholly frozen and absorb further salt very slowly. Those immersed for one hour at higher brine temperatures are not frozen and continue to absorb salt at a relatively high rate. It is apparent that the brine temperature, to minimize the rate of salt penetration during the initial periods of freezing, should be held as low as is feasible.

**BRINE CONCENTRATION:** Studies performed in this laboratory confirmed the belief that the brine concentration affects the rate at which salt penetrates into the meat of fish during the immersion-freezing process. Scrod haddock, after a 60-minute immersion in a eutectic (23 percent) sodium-chloride brine held at 15° F., contained 1.2 percent salt in the first quarter-inch of meat. Other scrod haddock, of the same history, frozen under the same conditions in a 15-percent sodium-chloride brine, contained 0.72 percent salt in the corresponding level of meat. There were no significant differences in the salt contents of the second quarter-inch levels of meat of the samples.

Studies of the effect of brine concentration on the penetration of salt into fish were discontinued when, to attain faster freezing rates for semicommercial operations, it was decided to use a eutectic (23 percent) sodium-chloride brine. As a result of the lower brine temperatures possible and the correspondingly faster freezing, the effect of brine concentration has not been a problem. All other results reported in this paper are based on the use of a eutectic brine.

**IMMERSION TIME:** The effect of the length of the immersion period (up to 24 hours) for fish in brines of different temperatures is shown in table 2. During the

Table 2 - Variation in Salt Content of Meat of Round Scrod Haddock Immersed in Sodium-Chloride (23 percent) Brine for Differing Times and at Differing Temperatures

Immersion Time	Salt Content					
	5° F.		10° F.		15° F.	
	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat
Hours	Percent	Percent	Percent	Percent	Percent	Percent
1	0.55	0.24	0.64	0.23	1.15	0.24
2	0.91	0.31	1.10	0.26	1.27	0.26
4	1.22	0.20	1.29	0.24	1.49	0.21
24	2.09	0.84	3.02	0.93	5.15	3.01

first portion of the immersion period there is a relatively high rate of penetration of salt. The rate of penetration tapers off as the immersion period is increased to such an extent that penetration during the second two hours of a four-hour immersion period is approximately only 1/3 of that occurring in the first two hours. The initial higher rate continues for a longer period of time in fish frozen in the brines of higher

temperatures. The relatively slow penetration occurring after the freezing of the outer layers of fish has been called "secondary penetration." It appears to persist throughout the immersion period. After 24 hours' immersion, the further increase in salt content due to "secondary penetration" is marked. It is greatly reduced, but not eliminated, by maintenance of lower brine temperatures. With the exception of the samples immersed for 24 hours, the increased salt content of the fish is again shown to be concentrated in the first quarter-inch of meat. After immersion for 24 hours, there is a noticeable increase in the salt content of the second quarter-inch of meat.

The results of the tests of salt penetration into fish immersed in cold (5° F.) brine for prolonged periods (up to 12 days) are shown in tables 3 and 4. Table 3

Table 3 - Effect of Prolonged Immersion of Round Scrod Haddock in Sodium-Chloride (23 percent) Brine at 5° F.

Immersion Time	Initial Weight of Fish	Weight Loss	Depth of Thaw in Meat	Total Salt Content <sup>1/</sup>
Days	Grams	Percent	Inches	Percent
1	2320	0.8	0	1.01
2	2330	1.7	1/32	2.22
4	2635	1.7	3/32	4.68
6	2215	3.1	5/32	7.40
8	2430	1.9	7/32	6.21
10	1845	2/8.1	9/32	10.6
12	2050	1.7	9/32	10.1

<sup>1/</sup> Of all meat above the lateral lines of the fish.

<sup>2/</sup> The high weight loss in this group of fish is as yet unexplained.

shows the thawing (due to increased salt content) which reached a readily measurable depth after 48 hours and reached a depth of 9/32 of an inch after the fish were immersed for 12 days. The corresponding increase in total salt content of the fish from 1.01 percent after being immersed in the brine for 1 day to 10.1 percent after 12 days' immersion is also shown. The high weight change occurring in the 10-day immersion group is not yet explainable. These figures, together with the initial weights of the various groups, are added to indicate the reason for the high total salt contents observed for the 6- and 10-

day immersion groups. Thawing due to salt penetration was first noticeable as a very slight softening of the skin of the fish. As salt continued to penetrate into the frozen meat, thawing occurred at greater depths. Shrinkage, due apparently to loss of water from the fish, began after 48 hours and eventually became so great as to cause outlines of the muscular striations to appear on the skin. After four days the tail section became pliable; this condition spread slowly to about one-third the length of the fish at the time the test was terminated. Upon examination of the cut cross-sectional surfaces, two sharply demarked areas were observed. Centers were hard frozen and white, but surrounding the hard-frozen areas were bands of soft, highly discolored, unfrozen meat.

Table 4 - Variation in Moisture and Salt Content of Meat of Round Scrod Haddock Immersed in Cold (5° F.) Sodium Chloride (23 percent) Brine for Extended Periods

Immersion Time	Moisture Content		Salt Content	
	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat
Days	Percent	Percent	Percent	Percent
2	76.8	80.6	4.48	1.39
4	74.5	77.7	5.81	3.57
6	73.6	75.5	7.51	5.64
10	71.8	70.8	10.3	8.98
12	69.4	69.7	12.3	10.7

Table 4 shows the increase in penetrated salt in the first and second quarter-inch levels of meat during the prolonged immersion test. The corresponding changes in the moisture content of the two levels of meat are also tabulated. After two days' immersion, when thawing was first observed, the salt content of the first and second quarter-inch levels were 4.5 and 1.4 percent, respectively. On the twelfth day of the tests the salt in the corresponding levels of the test fish had risen to 12.3 and 10.7 percent, respectively. The characteristic smoothing out of the salt gradient as thawing continues is borne out by the changes in moisture content in the two levels of the fish during the test. After two days the moisture content of the first and



second quarter-inch levels was 76.8 and 80.6 percent, respectively. After 12 days' immersion, the moisture content of the corresponding levels was 69.4 and 69.7 percent.

These studies indicate that the penetration of salt into nonfatty groundfish (haddock) of the northwest Atlantic continues throughout the period of immersion in brine. The work of Godsfil (1940) and of Lang and Farber (1939) on salt penetration into tuna during prolonged immersion in cold brines indicates that such secondary penetration is very much slower in these fish. Godsfil found that when tuna were immersed in brine at 20° F., 34 days' immersion was required before the salt struck through the first  $1\frac{1}{4}$  inches of meat. Lang and Farber found only 7 to 8 percent salt in the first quarter-inch of meat of tuna after immersion in cold (5° F.) brine for almost two months. Subsequent to the performance of this laboratory's work, a progress report by Harrison and Roach (1953) on brine freezing of fish was received. These investigators found no change in the sodium-chloride content of the meat of two types of fatty fish (king salmon and chum salmon) during brine freezing, whereas grey cod, similar in composition to cod and haddock found in the Atlantic Ocean, showed a distinct increase in salt content. Thus, there appears to exist a distinct difference in the permeability of the meat of brine-frozen fatty fish of the Pacific Ocean and that of the nonfatty groundfish of the Atlantic Ocean.

**BRINE COMPOSITION:** Table 5 shows the effect of a modified sodium-chloride brine upon salt penetration into the immersed fish. In the laboratory tests and under actual full-scale semicommercial operations at sea, the salt penetration in the first quarter-inch of meat of fish frozen in such a brine was reduced by from 25 to 33 percent below that of fish frozen in the usual eutectic sodium-chloride brine. No

Table 5 - Variation in Salt Content of Meat of Round Scrod Haddock Immersed for  $1\frac{1}{2}$  Hours in Sodium-Chloride (23 percent) Brine (5° F.) or in a Modified<sup>1/</sup> Sodium-Chloride (23 percent) Brine

Replicate	Salt Content			
	Sodium-Chloride Brine		Modified Sodium-Chloride Brine	
	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat
Number	Percent	Percent	Percent	Percent
Iced round fish frozen in the laboratory <sup>2/</sup>				
1	0.73	0.23	0.46	0.16
2	0.77	0.21	0.47	0.17
Frozen at sea under semicommercial conditions <sup>2/</sup>				
1	1.13	0.32	0.88	0.13
2	1.21	0.26	0.92	0.19

<sup>1/</sup> Modified brine contains sodium chloride (23 percent), calcium chloride (1.0 percent), and potassium chloride (0.6 percent).

<sup>2/</sup> The penetration of salt into iced fish frozen in the laboratory was, in all cases, less than that occurring under semicommercial conditions at sea.

atory). The quarter-nape or commercial fillet cut, which does not include the nape, contains, prior to water thawing, a total salt content of 0.72 percent. Such a salt content is well below that of the optimum salt level for palatability of brined fillets. From the standpoint of salt uptake it would appear that if adequate supervision of immersion time and brine temperature are exercised, eviscerated fish could be commercially frozen in brine.

**SALT CONTENT OF COMMERCIAL-FROZEN FISH:** Large-scale analyses were performed on random samples of scrod haddock and haddock frozen at sea during different voyages of the experimental trawler Delaware. The results of those analyses for salt penetration during freezing are shown in table 6. In all cases the

salt penetrated into the second quarter-inch of meat. These results seem to indicate that penetration is, in part, a diffusion process that may be minimized by the use of calcium salts in sodium-chloride brines.

#### EVISцерATED FISH:

The salt contents of the various portions of brine-frozen eviscerated fish are shown in figure 4. These studies indicate that, with the exception of the nape, the penetration of salt into these portions of fish is not excessive. At the most, it is within the range of greatest palatability for added salt in fish (unpublished data obtained at this labor-

penetration of salt was greater than that found in fish frozen under comparable conditions in the laboratory. Attempts are being made to determine the reason for this difference. Good agreement between samples is observed. The average salt content

Table 6 - Variation in the Salt Content of Replicate Random Samples of Haddock and Scrod Haddock Frozen at Sea in Cold (5° to 8° F.) Sodium-Chloride (23 percent) Brine Under Semicommercial Conditions

Replicate Sample	Salt Content			
	Large Haddock <sup>1/</sup>		Scrod Haddock <sup>2/</sup>	
	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat
Number	Percent	Percent	Percent	Percent
1	1.39	0.25	1.02	0.24
2	1.19	0.27	1.06	0.22
3	1.26	0.21	1.02	0.21
4	1.61	0.18	1.12	0.17
5	1.49	0.23	1.15	0.18
6	1.67	0.20	1.05	0.22
Average	1.4	0.22	1.11	0.21

<sup>1/</sup> Large haddock were immersed in the brine for 180 minutes.

<sup>2/</sup> Scrod haddock were immersed in the brine for 90 minutes.

**LEACHING OF SALT DURING WATER THAWING:** The random samples of brine-frozen and water-thawed scrod and large haddock had salt contents as shown in table 7. It is evident that a great proportion of the salt is leached from the meat during the thawing process. The slightly greater salt content of large haddock occasioned by the longer immersion periods necessary for freezing appears to be largely eliminated by leaching during the necessarily longer thawing period. In all samples, in the case of both scrod haddock and large haddock, the salt content has been reduced to a value only slightly greater than that of the normal unfrozen fish.

Concurrent work by this laboratory on salt uptake by haddock fillets during commercial brining prior to freezing included studies on palatabilities of and tolerances for differing levels of concentration of salt in the fillet. The work will be made the subject of another report but can be applied to studies of brine penetration to relate the observed salt contents to known tolerances for salt. Figure 2 shows a cross section of haddock at the point of maximum girth. The portions of the fish removed for sampling are indicated by the letters A (the first quarter-inch of meat) and B (the second quarter-inch of meat). The lateral and dorsal lines limiting the sample width are indicated. Table 8 indicates the salt content to be expected in these portions of brine-frozen haddock and scrod haddock, and also the salt content after water thawing. Since tests at this laboratory indicate a salt content of from 0.9 to 1.2 percent in the fillet to be optimum for palatability, the salt content of the first and second quarter-inch levels of the commercially brine-frozen and also of the water-thawed fish is indicated

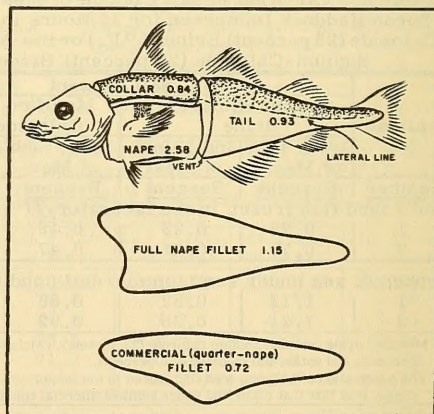


Fig. 4 - Variation in total salt (percent) content of various portions of eviscerated scrod haddock immersed in cold (5° F.) sodium-chloride (23 percent) brine for 90 minutes.



in terms of percentage of this optimum concentration. The salt content of the first quarter-inch of meat of fish, frozen for three hours, is seen to be slightly above the optimum. That of the scrod haddock is in the optimum range. In both cases the second quarter-inch of meat is bland and "flat" to taste. The salt content of the first quarter-inch of meat of both haddock and scrod haddock after adequate water thawing is reduced to a concentration below that discernible by the palate. The fillets prepared for such fish are bland and "flat" to the taste. It is probable that, contrary to reports of possibly excessive saltiness, fillets prepared from brine-frozen and subsequently water-thawed fish would require, to attain desirable saline palatability, dipping in light brines.

Table 7 - Variation in Salt Content in Meat of Replicate Random Samples of Haddock and Scrod Haddock Thawed (200 and 120 minutes, respectively) in Water at 60° F. After Being Brine-Frozen<sup>1</sup> at Sea

Replicate Sample	Salt Content			
	Large Haddock		Scrod Haddock	
	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat	1st $\frac{1}{4}$ -inch of Meat	2nd $\frac{1}{4}$ -inch of Meat
Number	Percent	Percent	Percent	Percent
1	0.41	0.19	0.36	0.20
2	0.38	0.20	0.36	0.18
3	0.38	0.25	0.33	0.22
4	0.36	0.18	0.25	0.21
5	0.35	0.19	0.34	0.24
6	0.68	0.17	0.29	0.18
Average	0.43	0.19	0.32	0.21

<sup>1</sup> Haddock and scrod haddock were frozen in brine at 5° to 8° F. for 180 and 90 minutes, respectively.

would require, to attain desirable saline palatability, dipping in light brines.

### CONCLUSIONS

Salt penetration into the meat of fish during immersion freezing varies directly with the temperature of the brine. The increased penetration reaches serious proportions from the standpoint of palatability when the brine temperature is 15° F. or above. For this reason and because of the increased penetration observed under commercial-freezing conditions, it is recommended that temperature of a sodium-chloride (23 percent) brine be maintained at or preferably below 10° F. when freezing fish.

Immersion of the fish for periods of time longer than is required for freezing causes an unnecessarily excessive penetration of salt. The initial penetration is rapid until the outer layers of meat have been frozen. The rate of penetration then tapers off but continues slowly throughout the immersion period. This "secondary penetration" is greatly reduced but not eliminated by maintenance of the lowest feasible brine temperatures. Contrary to results observed by other investigators with brine-frozen fatty fish, prolonged immersion of haddock, a nonfatty groundfish, causes it to thaw as a result of excessive penetration of salt. The two closely interrelated factors of brine temperature and immersion time govern, in the main, the penetration of salt into the meat. For these reasons it is recommended that immersion times be restricted to four hours or less, if possible.



Fig. 5 - Testing the fillets in the laboratory.

An increase in brine concentration causes a proportional increase in the penetration of salt into fish during the freezing process. The Boston Laboratory, thus

far has standardized for semicommercial operations on a eutectic (23 percent) sodium-chloride brine. As a result of the lower freezing temperatures and faster freezing rates possible through use of such brines, the effect of brine concentration upon salt penetration has not been a problem.

The addition of small quantities of calcium (1 percent) and of potassium (0.6 percent) salts to a sodium-chloride brine retards the penetration of salt into the

Table 8 - Salt Content of Brine-Frozen and Water-Thawed Haddock and Scrod Haddock Expressed in Both Percentage and Percentage of Optimum Salt Content for Palatability<sup>1/</sup>

Sample	Salt Content			
	Brine-frozen		Brine-frozen and Water-thawed	
	Percent	Percent of Optimum Palatability	Percent	Percent of Optimum Palatability
Haddock:				
1st $\frac{1}{4}$ -inch of Meat	1.4	127	0.43	39
2nd $\frac{1}{4}$ -inch of Meat	0.22	20	0.19	17
Scrod haddock:				
1st $\frac{1}{4}$ -inch of Meat	1.1	100	0.32	29
2nd $\frac{1}{4}$ -inch of Meat	0.21	19	0.21	19

<sup>1/</sup> The percentage of optimum palatability is based on the optimum salinity (1.1 percent) as found by experiment. Those values which are below 50 percent of optimum palatability are below the taste threshold for salt in fish.

fish frozen in such a brine. Salt content in the first quarter-inch of meat of fish frozen in the "modified" brine is 25 to 33 percent lower than in control fish frozen in the usual sodium-chloride brine.

The salt content of commercial fillets prepared from fish that were eviscerated prior to brine freezing is below the range of optimum palatability for salt (0.9 to 1.2 percent). Further, water-thawing of the fish prior to filleting reduces the salt content to a level below the taste threshold for salt (0.5 to 0.6 percent) in fish. Excessive salt penetration occurred only in the nape of the fish, a portion which is not normally incorporated into the commercial fillet.

The salt gradient analyses of random samples of fish, though drawn from lots frozen during different voyages of the Delaware, indicate that differences in the content of penetrated salt are not large under normal operating conditions. After water-thawing of the fish, the salt content is reduced to a level which is usually below the taste threshold for salt in fish.

The analyses further show that excessive penetration did not occur in routine freezing operations. The penetration of salt in scrod haddock and large haddock has been shown to be restricted almost wholly to the first quarter-inch of meat during freezing under semicommercial conditions. It has further been shown that the penetrated salt is leached during water-thawing to such an extent as to bring about a bland or "flat" taste to the final product.

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## LOBSTER PEGS

The whittling of lobster pegs is a pastime that brings monetary returns for many residents along the western coast of Nova Scotia. Used to plug the claws of lobsters after they have been caught to prevent them from damaging each other, the pegs find a market both in Canada and the United States. West Pubnico is a typical peg-whittling community. Here young and old alike, knife in hand, shave pieces of wood to the desired size to while away their spare moments.



--Trade News, March 1954.



## FISHERY TECHNOLOGICAL RESEARCH PROGRAM

Fishery technological research is developed from recommendations received from members of the fishery and allied industries. Generally in June of each year members of the Branch of Commercial Fisheries, the chiefs of the Branch's technological research laboratories, and representatives of the fishery and allied industries meet in Washington, D. C., to discuss the progress on projects carried out during the preceding fiscal year and to help develop a program for the next fiscal year (beginning July 1). Such meetings assist the Service in formulating a sound research program by providing information on the projects of greatest importance to the industry and by offering an opportunity for the mutual exchange of ideas.

This year the Technological Section - Industry Conference was held on June 9, 1954, in Washington, D. C.<sup>1/</sup> Industry participation and response was extremely gratifying. A complete review was made of the progress on projects during Fiscal Year 1954. Then, discussions were held regarding the program for the next fiscal year (1955).

This article contains:

1. A summary of the progress on fishery technological research projects for Fiscal Year 1954.
2. A list of reports issued by the Technological Section during the year.
3. The new program for Fiscal Year 1955 developed from the recommendations of the Technological Section - Industry Conference as far as funds and Service limitations permit.

Technological research is carried out in four field laboratories located in East Boston, Mass., College Park, Md., Seattle, Wash., and Ketchikan, Alaska. The Alaska laboratory is sponsored jointly by the U. S. Fish and Wildlife Service and the Fisheries Experimental Commission of Alaska. University and Industrial fellowships are maintained in all laboratories. Limited laboratory facilities are available by contract for University, State, or industrial-sponsored projects. Results of any such research becomes public property and is available to the entire industry.

## PROGRESS ON FISCAL YEAR 1954 FISHERY RESEARCH PROJECTS

A discussion of the Fishery Technological Research Program for Fiscal Year 1954 (July 1, 1953, to June 30, 1954) appeared in Commercial Fisheries Review vol. 15, no. 10 (October 1953), pp. 25-28 (also reprinted as Separate 360). The city

at the end of each project report indicates the Service laboratory that is conducting the work for the project. (The complete address of each laboratory is shown in the Technological Section's Organizational Chart on page 26.)

<sup>1/</sup>Minutes of this meeting are available from the Branch of Commercial Fisheries, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.



## NUTRITION:

1. Toughening of Frozen Blue-Crab Meat: Practically no work was done on the project because a competent research fellowship student could not be obtained.

(College Park)

2. Chemical and Physical Properties of Fish and Shellfish Proteins: Work, which has dealt with drip in frozen fish, has indicated that drip may be of minor practical importance if the frozen fish is cooked without thawing. Under such conditions the total drip formed during cooking bears less relationship to the period of time which the fish had been in frozen storage than does drip which forms when fish is first thawed before cooking. The amount of drip in fish which has never been frozen at all is considerable after the fish is cooked. Thus, drip caused by prolonged storage may not increase the total amount of cook drip by any great amount. When the fish are cooked without thawing, nothing is discarded and drip is then of minor significance.

(Seattle)

3. Chemical Changes in Fish Protein during Freezing and Storage: Deterioration in the quality of frozen fish products is due in part to changes occurring in the protein fraction generally classified as "denaturation." It has been shown by physical methods that, of fish proteins, the actomyosin fraction is the most subject to these changes. Since little is known of the nature and rate of these changes, the resulting properties of thawed fish proteins are being studied and compared with "native" fish proteins. Such properties include resulting chemical activity, molecular size and shape, solubility, and the state and power of hydration of fish proteins.

(Ketchikan)

4. Comparison of Nutritive Value of Fish and Meat: In the fall of 1952, 10 girls at the College of Home Economics of the University of Maryland consumed a low-protein basal diet for a period of 54 days. Five of the girls received in addition a serving of baked haddock filets and five received a similar allotment

of roasted beef. Quantitative samples were taken of all food eaten and all feces and urine that was voided. Since then fellowship students have been analyzing the samples to determine the retention of protein from the two sources and the composition of the blood samples taken at two-week intervals. The data summarized in a Master of Science thesis indicates no significant difference in results between the diets containing the two animal proteins.

Another fellowship student is now determining the caloric content of randomly-selected samples of the diet by proximate analyses and direct calorimetry to determine the effect of caloric intake on the economy of protein utilization. Preparation is also being made to continue these comparative studies with girls consuming diets containing less protein in the basal diet and different allowances of fish and beef. In this way it is hoped to determine the minimum levels of each which will give a positive balance of protein and satisfactory blood composition.

(College Park)

5. Canned Tuna Discoloration: This is a collaborative project with Continental Can Company. It has been determined that the extent to which the fish is pre-cooked is not a significant factor in causing sulfide discoloration. Spoilage of tuna is a minor factor in causing such discoloration. It has been determined that the principal source of sulfide sulfur is the intact fish proteins, rather than breakdown products of smaller molecular weight. Investigation of other factors which may be the cause of discoloration of canned tuna is continuing. In particular, attention is being given to the effect of different types of feed in the tuna stomachs when caught upon sulfide discoloration of the canned product.

(Seattle)

6. Feeding Studies with Irish Moss Gums: Gums are being extracted commercially from Irish moss, and derivations of these are being used in foods and pharmaceutical preparations. Rats and mice have been allotted to 5 comparable groups and are fed a balanced ration to which has been added 0-, 1-, 5-, 15-,

and 25-percent gum. All of the animals died, and preserved tissues of the important organs of practically all individuals are being studied by a cooperating pathologist to determine the effect of diet on tissue structure. Weekly data on the weight and food and water intake for the individual rats are being summarized for publication. The data so far analyzed indicate that the product is wholesome.

(College Park)

## REFRIGERATION:

1. Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets: OVERHAUL OF THE "DELAWARE" AND FISHING OPERATIONS: The Delaware was drydocked and given its annual overhauling preparatory to fishing operations. Changes were made in the absorption refrigeration system to increase output. Alterations in the brine freezer were completed, which not only made possible an increase in freezing capacity but also permitted loading and unloading of the freezer at deck level.

Several successful cruises were made during the summer and fall of 1953. Following minor changes in the brine-freezing mechanism, very satisfactory results were obtained. Experimental lots of fish were supplied for studies in the laboratory and pilot plant. Fish frozen in-the-round at sea were landed at the Boston Fish Pier and sold to producers for processing into fillets. Cruises were made with a full complement of men to permit round-the-clock fishing operations. A preliminary economics study was made under these conditions in order to obtain cost figures for freezing fish at sea.



The Service's research trawler Delaware at the East Boston Laboratory dock.

A serious fire occurred aboard the Delaware near the close of the fishing season. Although there was no damage to refrigeration machinery and freezing equipment, the after part of the vessel was damaged considerably. Plans for restoration of the vessel proceeded satisfactorily, and the vessel was ready for fishing at the end of the fiscal year.

**UNLOADING, STORING, AND PROCESSING ASHORE:** Data were collected on rates of handling and storage-volume requirements of brine-frozen fish both aboard the vessel and ashore. Satisfactory procedures for transferring the frozen fish from a vessel into cold storage were evolved. Boxes holding about 400 pounds of brine-frozen fish proved efficient as both transfer and storage containers. Brine-frozen fish stored in such boxes, or otherwise treated to minimize desiccation (e.g. spray-glazing), were stored satisfactorily for well over six months. After the stored fish were thawed they were of excellent appearance and filleted well.

In commercial-scale studies the time required to scale and fillet thawed round haddock and the yields of fillets therefrom compared very favorably with similar data for iced eviscerated haddock. Data were secured on the rates of thawing in circulating water at various temperatures. In water warmer than 75° F. danger of adverse effects on the quality of the thawed fish was noted.

**LABORATORY TESTS:** Studies on the frozen-storage life, prior to filleting, of round fish frozen at sea have been made with the assistance of a large consumer taste panel composed of residents in the Boston area. Results obtained to date strongly suggest that round-frozen fish may be held in storage for at least six months prior to filleting. Studies performed to date indicate that the quality of fillets prepared from round brine-frozen haddock is equally as good as that for fillets from iced gutted fish.

During immersion-freezing of fish, penetration of salt becomes excessive only when high brine temperatures and/or excessively long immersion periods are used. Salt analyses of random samples of water-thawed haddock which had been



brine-frozen at sea under semicommercial conditions indicate that penetrated salt is leached during the thawing process. Adequate thawing was shown to reduce the salt content in the first quarter-inch of meat to below 0.5 percent, which is not objectionable to the taste.

Studies on the immediate effects of brine-dipping on the physical, chemical, and organoleptic characteristics of haddock fillets were completed. Studies were performed on fillets from both iced and brine-frozen fish. Results indicate that fillets from frozen fish absorb slightly more salt than do those from iced fish. Other than salt absorption, no significant differences were noted between fillets of iced and of brine-frozen fish after dipping in tap water or in one of six concentrations of brine.

Studies made with various types of immersion-freezing media indicate that requirements posed by costs and by the equipment presently available on the Delaware limit the possibilities to the use of inorganic media. The effects of such media on flavor during extended cold storage are being investigated.

(Boston)

2. Quality Standards for Haddock Fillets: A set of standards for evaluating the quality of packaged frozen haddock fillets was prepared. These standards should assist in comparing fillets from brine-frozen haddock and fillets from iced haddock. As a first step towards evaluating precooked fillets and "sticks," factors effecting their quality have been investigated.

(Boston)

3. Manual on the Refrigeration of Fish: Completion of this manual has been delayed by necessary shifts in personnel. Considerable information has been compiled from periodicals, domestic and foreign governmental sources, etc. Surveys have been carried out at fishing ports, freezing plants, and at wholesale and retail cold-storage warehouse outlets to obtain the latest information on practices in the frozen fish industry.

(Washington, D. C.)

4. Cold-Storage Life of Fish: Cold-storage life tests on 1 batch each of 12 species of fresh-water fish were completed. Lake whitefish, sheepshead, carp and bullhead have average cold-storage life (i.e. they keep in marketable condition for about 9 months at 0° F. though some deterioration takes place). Lake smelt, eulachon, lake trout, buffalofish, and lake chub have less than average cold-storage life. Yellow pike, yellow perch, and blue pike have exceptionally long cold-storage life. Cold-storage life estimation is continuing on six species of fresh-water fish and on several marine species. Improved handling methods (such as use of antioxidants) are being sought for prolonging the storage life of those species which are difficult to store.

(Seattle)

5. Cause of Texture Change of Canned Salmon Prepared from Frozen Fish:

Large amounts of proteinaceous curd are formed on the surface of canned salmon prepared from frozen fish. Dipping thawed salmon steaks in a five-percent solution of tartaric acid before canning effectively reduced curd formation. Salmon steaks treated with tartaric acid solutions did not stick to the can after processing as did untreated and brined steaks. Visual examination indicated that the surface protein is coagulated by the action of the acid. Brining thawed salmon steaks before canning resulted in some reduction in curd formation but was not as effective as the acid dips.

The retention of extra-cellular fluids or drip is caused by muscle proteins swelling and imbibing free liquid. This liquid-binding power of muscle proteins is influenced by salt content and pH, and exhibits a zone of minimum effect corresponding to the "isoelectric zone" of fish-muscle proteins. The retention of fluid on processing, with corresponding curd reduction, was shown to depend upon the liquid-binding power of the proteins above about pH 6.5 occasioned by the presence of about 2- to 5-percent salt in the meat. The reduction of curd by dissolving surface-soluble proteins using a strong brine was of questionable value. This project was completed on July 16, 1953.

(Ketchikan)

6. Preparation and Storage Tests of Frozen Fish Sticks: In this new project attempts are being made to adapt Pacific rockfish for making fish sticks. Such sticks are being prepared from whole rockfish fillets and from the dark and light meat of this species, and storage tests are being carried on to determine the keeping quality of the frozen products.

(Seattle)

## PROCESSING AND PRESERVATION:

1. Specialty Food Products from Alaska Fish and Edible Fish Trimmings: Development work was continued on a canned smoked shrimp product and processing times were determined for  $\frac{1}{4}$ -pound and  $\frac{1}{2}$ -pound cans. A final report was received from the National Canners Association Laboratory, Berkeley, California, on the storage tests with inoculated packs of smoked salmon-egg spread. This product had sufficient salt (sodium chloride) incorporated so that there was



Ketchikan, Alaska, Laboratory (center) and boat harbor.

a salt content in the spread greater than eight percent which should protect the product from the dangers of botulism even though the product was stored at room temperature. The National Canners Association Laboratory concluded that this smoked salmon-egg spread product presented no hazard of botulism. Work was continued on the preparation of a canned smoked salmon spread from frozen chum salmon and a good product has been developed. Several specialty products were prepared and served as appetizers at the sea-food banquet of the Fourth Alaska Science Conference sponsored by the American Association for the Advancement of Science in Juneau, Alaska.

(Ketchikan)

## ANALYSIS, COMPOSITION, AND SPECIFICATIONS:

1. Composition of Fish: Determination of the proximate composition of several species of fresh-water fish continued. Effect of the area in which the fish is caught and the season of catching is being investigated using sheephead (a species caught commercially in a wide variety of waters, including the Great Lakes, small lakes, and rivers) as a test species. Work is also being carried out on the proximate composition of marine fish, including various soles, rockfish, and halibut.

(Seattle)

2. Determination of Oil in Fish Meal: No work was carried out on this project.

(Seattle)

3. Federal Specifications for Fishery Products: Only intermittent part-time work was carried out on this project. Revision of the specification for canned salmon, PP-S-31b, was completed. The revision of the specification for fresh (chilled) and frozen fish, PP-F-381c, was approved by the Provisions Technical Committee in February and the specification was prepared for publication. Data were obtained for revision of specifications for canned shrimp, PP-S-311a, and fresh (chilled) and frozen shrimp, PP-S-316a. The first draft of the former was submitted for informal coordination with the Armed Services and for incorporation of military requirements. The first draft of the latter was prepared by the Fisheries Subcommittee of the Provisions Technical Committee in preparation for informal coordination with the Armed Forces. Next in line for consideration are specifications for canned sardines, PP-S-51b, and fresh crab meat, PP-C-656.

(Washington, D. C.)

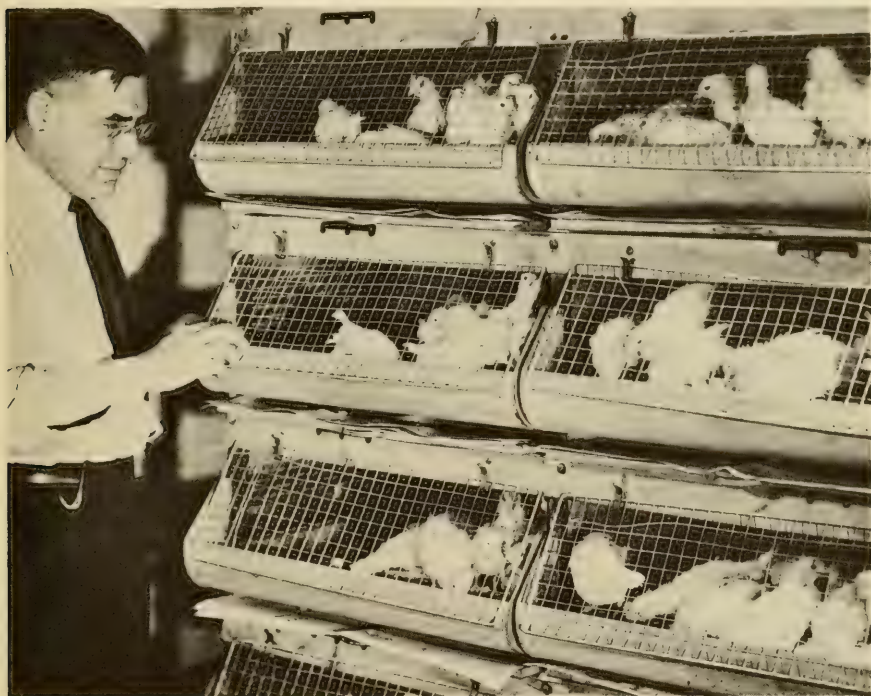
## BYPRODUCTS:

1. Vitamin Content and Nutritive Value of Fishery Byproducts--Biological Studies: FEEDING STUDIES WITH MENHADEN OIL: Twenty-four groups of broilers in battery cages were fed from 7 to 12 weeks



a practical broiler diet which contained from 0- to 8-percent menhaden or corn oil. It was found that none of the broilers showed any evidence of disease due to the oil in their feed even though no precautions were taken to feed fresh oil only. All birds, except those receiving the 8-percent level of menhaden oil, grew satisfactorily. The broilers receiving this high level of oil did not consume quite as much feed as the rest. The meat of the birds receiving about  $1\frac{1}{2}$  percent menhaden oil or less in the diet had an excellent flavor, but that of birds receiving more than this had an off- or very fishy flavor.

was taken to use fresh oil or use freshly-mixed feed. Those receiving the diets containing 0-, 1-, and 2-percent levels of oil started laying within the normal age range and all of the eggs had desirable color and an excellent flavor. Pullets receiving the 8-percent level of oil did not start laying until alpha tocopherol was added to the diet. These birds then started to lay and all eggs had a satisfactory color and most of them had an excellent flavor. Apparently alpha tocopherol acting as vitamin E or as an antioxidant was the only nutrient that the diet of natural feeds did not supply in sufficient quantity to permit laying when the



Battery of chicks used in evaluating unknown growth factors in fishery byproducts.

Individual pullets in indoor cages were fed growing or laying diets containing 0-, 1-, 2-, and 8-percent menhaden oil for a period of about 10 months. It was found that all pullets remained healthy and free from disease, although no effort

high levels of menhaden oil were fed.

FEEDING EXPERIMENTS TO DETERMINE NUTRITIVE QUALITY OF THE PROTEIN OF FISHERY BYPRODUCTS: Battery-caged chicks were fed a low-pro-

tein diet for a 2- or 3-week depletion period. Comparable groups were then fed the same diet except that 3 percent additional protein from fish meals, condensed solubles, or dried solubles replaced an equal weight of carbohydrate. The increase of live weight over a period of three weeks was used as an index of protein quality. The object was to determine the reason for the apparent variability in the nutritive quality of protein. The data have not yet been analyzed so no conclusions can be made.

Some preliminary feeding tests with rats are being conducted to determine the nutritive value for growth and reproduction of fish-meal press cake and certain canned pet foods. The experiments have not been conducted long enough to formulate conclusions.

**BIOASSAYS OF UNIDENTIFIED GROWTH FACTORS IN FISHERY BY-PRODUCTS:** Numerous assays were conducted with rats and with micro-organisms to determine the content of unidentified growth factors in fishery by-products. Perfect correlation in results has not been attained and this is probably due to different requirements of the rat and micro-organisms for growth factors. No generalizations can yet be made as to what fishery byproducts are excellent or poor sources of the unidentified growth factors and what processing steps concentrate or destroy them in the various byproducts. It is not yet certain how many growth factors are needed by animals, but fishery byproducts apparently contain more than one factor.

(College Park)

**2. Vitamin Content and Nutritive Value of Fishery Byproducts--Chemical and Microbiological Studies:** Determination of the range of protein, moisture, oil, riboflavin, niacin, and vitamin B<sub>12</sub> content of samples, each representing a carload lot of the following fish-meal samples, have been completed: 13 of tuna meal, 8 of mackerel meal, 1 of anchovy meal, and 23 of pilchard meal. Similar work on samples of Alaska herring meal is under way as are analyses of a large number of samples representing smaller lots of menhaden and crab meals. Tuna meals have a somewhat higher content of

riboflavin, niacin, and vitamin B<sub>12</sub> than do meals prepared from the other species of fish.

(Seattle)

**3. Utilization of Viscera from Round (Whole) Fish:** Due to a shortage of laboratory personnel, work did not get under way until about the middle of the fiscal year. A literature survey was made prior to beginning actual laboratory work. Proximate analyses of total viscera and of sorted parts are now being conducted.

(Boston)

**4. Study of Pharmaceutical and Other Industrial Products from Salmon Eggs:**  
**PART I. AMINO ACID CONTENT OF SALMON EGG PROTEIN:** This phase was completed May 16, 1953.

The "essential" amino acid content of roe at different stages of maturity from the five species of Pacific salmon has been determined by microbiological assay methods. The distribution of amino acids in the roe was generally uniform, being significantly altered only by maturity. Most of the amino acids were present in increasing quantities with increasing maturity. The average amino-acid content of mature roe from the five species of salmon expressed as percentage of protein was: arginine 7.1; histidine 2.8; isoleucine 7.3; leucine 10.0; lysine 8.8; methionine 2.9; phenylalanine 4.9; threonine 5.9; tryptophane 1.0; and valine 7.3.

**PART II. THE FATTY ACIDS OF SALMON EGG OILS:** The long chain unsaturated fatty acids present in salmon-egg oil have considerable promise for specialized applications but basic information is lacking. A study of the fatty-acid distribution in salmon-egg oils is currently in progress.

(Ketchikan)

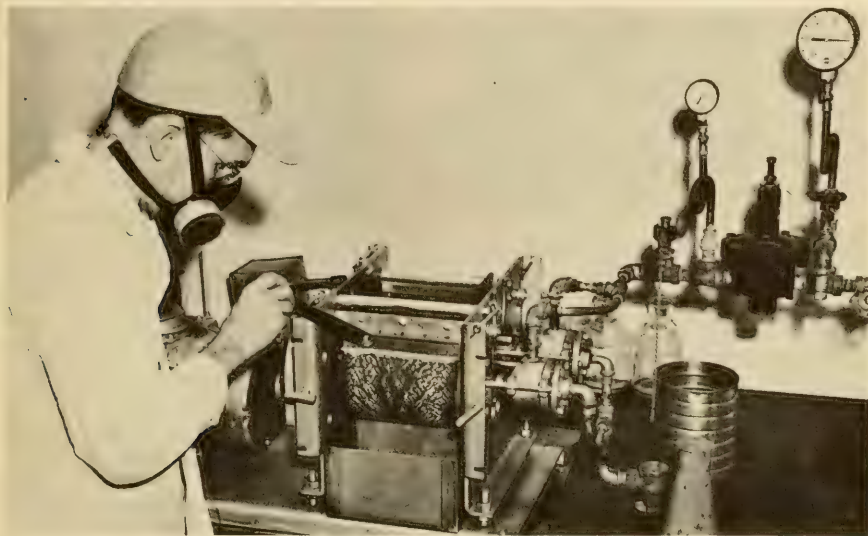
**5. A Dried Product from Condensed Menhaden Solubles or Stickwater:** Production of condensed menhaden solubles for the 1953 season was at a record high level, and new plants in construction should result in further increases in production. This rapid increase in produc-



tion has stimulated the interest in dry solubles as the development with the greatest promise for expanding the market potential for condensed solubles. Samples of condensed solubles from most of the plants on the Atlantic and Gulf Coasts have been collected, and the chemical and physical characteristics determined. These samples have been dried

will be through the use of one or more additives. However, chemical and physical characteristics of individual lots of condensed solubles must be considered if difficulties in drying the condensed solubles and then grinding the dry product are to be avoided.

(College Park)



Preparing dried menhaden solubles using the experimental drum drier.

on a small-drum dryer and graded numerically for physical characteristics and behaviors during the drying process. This "drying suitability" grade is now being correlated to the analytical data on the corresponding samples of condensed solubles as well as to the behavior of the dry product when exposed to controlled relative humidities in the range of 30 to 65 percent. Small lots are also being packaged in protective multiwall kraft paper bags to study storage characteristics. Selected lots of condensed solubles are also being dried after mixing with additives. Both chemically-active and inert additives and combinations are being tried for their effect on the properties of the dry product. Preliminary indications are that the practical elimination of excessive hygroscopicity of dry solubles

6. Chemical Evaluation of Fish Oils and Investigation of New Uses: A method for separation of fatty acids into saturated and unsaturated fractions has been adapted to fish oils. The procedure involves crystallizing urea fatty-acid complex compounds from solvents at different temperatures. Employing this technic, five different fish oils have been fractionated into saturated and unsaturated components. These include menhaden, herring, tuna, salmon head and viscera, and salmon-egg oil. In the case of salmon-egg oil, more than half the oil has been separated as a highly unsaturated (iodine value about 300) fraction of potentially much greater value than the original oil.

Work is now under way on preparation from fish oils of such compounds as alkyl

halides, amines, quaternary ammonium compounds, and silicone derivatives. This work must proceed in two stages. First, compounds of known structures are prepared from pure fatty acids which occur in fish oils. Many of these compounds, derived from long-chain fatty acids, have never been reported in the literature. This phase of the work is now well under way. The second phase will be to prepare mixed derivatives from the fish oils themselves. These will be mixtures of compounds from the various fatty acids which make up fish oils. Such mixed compounds could best be produced commercially without necessity for separation into the pure compounds from individual fatty acids.

(Seattle)

## REPORTS BY THE TECHNOLOGICAL SECTION DURING FISCAL YEAR 1954

### COMMERCIAL FISHERIES REVIEW:

Glazing Brine-Frozen Salmon, by D. T. Miyauchi, Technical Note No. 26, vol. 15, no. 5 (May 1953), pp. 24-25 (Sep. 350).

Alaska Pollock: Proximate Composition; Amino Acid, Thiamine, and Riboflavin Content; Use as Mink Feed; by R. G. Landgraf, Jr., Technical Note No. 27, vol. 15, no. 7 (July 1953), pp. 20-22 (Sep. 354).

Freezing Fish at Sea--New England, Part 7 - Pictorial Story of Operations at Sea and Ashore, by the Technical Staff of the Boston Laboratory, vol. 15, no. 12 (December 1953), pp. 1-12 (Sep. 362).

Possibilities for the Production of Fishery Specialty Products in Alaska, by R. G. Landgraf, Jr., Technical Note No. 28, vol. 15, no. 12 (December 1953), pp. 18-19.

Salt Content of Salmon Canned from Brine-Frozen Fish, by D. T. Miyauchi and M. Heerdt, vol. 16, no. 1 (January 1954), pp. 8-10 (Sep. 364).

Vitamin Content of Fishery Byproducts: I - Effect of Processing Methods on the Riboflavin, Nicotinic Acid, and Vitamin B<sub>12</sub> Content of Solubles and Meal, by Neva L. Karrick and M. E. Stansby, vol. 16, no. 2 (Feb. 1954), pp. 7-10 (Sep. 366).

Effect of Salt on the Storage Life of Salmon Eggs Preserved with Sodium Bisulfite, by R. G. Landgraf, Jr., Technical Note No. 29, vol. 16 no. 2 (Feb. 1954), pp. 13-15 (Sep. 367).

Freezing and Cold-Storage of Pacific Northwest Fish and Shellfish: Part III - Storage Characteristics of Six Species of Oily Fish, vol. 16, no. 6 (June 1954), pp. 1-8 (Sep. 372).

### LEAFLETS AND SCIENTIFIC REPORTS:

Salmon Cannery Waste for Mink Feed, by James R. Leekley, R. G. Landgraf, Jr., Jeanne E. Bjork, and William A. Hagevig, Fishery Leaflet 405, November 1952, 31 pp.

Use of Fish Products in Blueback Salmon Diets, by M. E. Stansby and Staff and Roger W. Burrows and Staff, Special Scientific Report: Fisheries No. 106, November 1953, 59 pp.

Utilization of Alaska Salmon Cannery Waste, by M. E. Stansby and Staff, Special Scientific Report: Fisheries No. 109, September 1953, 107 pp.

### REPORTS OF THE FISHERIES EXPERIMENTAL COMMISSION OF ALASKA:

Home Canning Alaska Fish and Shellfish, by R. G. Landgraf, Jr., Christine Heller, and John A. Dassow, Technical Report No. 4, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska, July 1953, 12 pp.

Proximate Composition and Vitamin Content of Rations, and Fish Components Fed at the Experimental Fur Station, Petersburg, During 1949, 1950, and 1951, by R. G. Landgraf, Jr., Technical Report No. 5, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska, May 1953, 11 pp.



Specialty Products from Alaska Herring by R. G. Landgraf, Jr., and H. J. Craven, Technical Report No. 6, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska, July 1953, 6 pp.

#### REPORTS IN TRADE OR SCIENTIFIC PERIODICALS, AND ADDRESSES:

Recent Progress in Fishery Byproducts Research, by F. Bruce Sanford, Fifth California Animal Industry Conference Proceedings, 1952 (1953).

Recent Progress in Fishery Byproducts Research of Interest to the Animal Feed Industry, by F. Bruce Sanford, National Fisheries Institute Yearbook, 1953, pp. 99-105.

Alaska Salmon Waste Potential, by Howard J. Craven, National Fisheries Institute Yearbook, 1953, p. 107.

Fat in Fish Meal by M. E. Stansby, Journal of the Association of Official Agricultural Chemists, vol. 36, no. 2 (May 1953), pp. 202-211.

The Amino Acid Content of Roe at Different Stages of Maturity from the Five Species of Pacific Salmon, by Harry L. Seagran, David E. Morey, and John A. Dassow, Journal of Nutrition, vol. 53, no. 1 (May 1954), pp. 1-11.

Freezing Fish at Sea, by J. F. Puncochar and S. R. Pottinger, Food Technology, vol. 7, no. 10 (October 1953), pp. 408-411.

Fishery Byproducts, by F. Bruce Sanford, Fishing Gazette Annual Review Number 1953, pp. 208-216. (1953).

Freezing Fish at Sea--New England: Studies of Miscellaneous Handling Problems, by Harris W. Magnusson. Presented at the International Fish Symposium, Swedish Institute for Food Preservation Research, Gothenburg, Sweden, November 18, 1953.

Some Factors Affecting the Salt (Sodium Chloride) Content of Haddock During Brine-Freezing and Water Thawing, by J. A. Holston and S. R. Pottinger. Presented at Annual Convention of American Association for the Advancement of Science, Boston, Mass., December 29, 1953.

Freezing Shrimp at Sea, by John A. Dassow, read at the Gulf and Caribbean Fisheries Institute Meeting, Miami, Florida, November 1953. Published in Southern Fisherman 1954 Yearbook, vol. 14, p. 103 (1954).

The Experimental Freezing Trawler Delaware, by C. P. G. Oldershaw. Presented at the Gulf and Caribbean Fisheries Institute Meeting, Miami, Florida, November 1953.

Composition of Certain Species of Freshwater Fish. I - Introduction: The Determination of the Variation of Composition of Fish, by M. E. Stansby. Read at June 1953 meeting of Institute of Food Technologists in Boston. Published in Food Research, vol. 19, no. 2 (1954).

Feeding Menhaden Oil to Growing and Laying Pullets, by Hugo W. Nilson, Accepted for publication in Southern Fisherman.

#### REPORTS IN PREPARATION:

Freezing Fish at Sea--New England:

Some Economic Aspects, by Morton Garfield.

Immediate Effects of Brine Dipping Upon Fillets from Iced and from Brine-Frozen Fish, by John Holston and S. R. Pottinger.

Water Soluble Protein as an Indicator of Added Solubles in Whole Fish Meal, by Charles F. Lee.

Composition of Cooked Fish Dishes, by Charles F. Lee (being prepared for printing).

## RESEARCH PROGRAM FOR FISCAL YEAR 1955

Fishery technological research program for Fiscal Year 1955 (July 1, 1954, to June 30, 1955) was developed from recommendations received from members of the fishing and allied industries. Assignment of projects was made after taking into consideration the location, facilities, and personnel at each of the four technological laboratories and the funds available. Projects are listed by area and laboratory.

### NORTH ATLANTIC (EAST BOSTON, MASS.):

1. Freezing Fish at Sea--New England: Information will be secured on freezing, cold-storage, and acceptability characteristics of species other than haddock, such as ocean perch, whiting, pollock, red hake, and others. Particular emphasis will be placed on determining if these fish, when frozen aboard vessel, can be thawed later and used as raw material for precooked frozen fish sticks, uncooked portion-size frozen fish squares, and other ready-to-serve fish products.

2. Utilization of Waste Materials from Fish Frozen at Sea: Work on this project begun the middle of Fiscal Year 1954 will be continued. Proximate analyses of total viscera and of sorted parts will be conducted preliminary to manufacture of the viscera and frames into conventional fish meals, fish solubles, and solvent-extracted meals. Samples of commercial-scale products from frozen-at-sea waste materials will be compared for B<sub>12</sub> content and other growth factors with products from waste of fish refrigerated by icing. New uses for fresh viscera will be sought.

3. Voluntary Quality Standards for Haddock Fillets: Tentative standards for evaluating the quality of packaged frozen haddock fillets have been prepared to assist in comparing the quality of fillets from haddock brine-frozen at sea with fillets from iced haddock. The suggested standards now require further Service and industry review.

4. Fish Sticks--Voluntary Quality Standards and Storage Characteristics (Atlantic Coast): Standards for fish sticks and the block fillets from which they are prepared will be developed in cooperation

with industry to eliminate the production and marketing of poor-quality products. Background information will be obtained from Federal agencies establishing standards for similar food products. Procedures and problems in fish-stick production will be studied through visits to fish-stick plants in the New England area. Research initiated on the cold-storage life of fish sticks during the latter part of the last fiscal year will be continued. Samples of fish sticks prepared from various kinds of raw material in the laboratory and in commercial processing plants will be stored in commercial cold storage to obtain information on both storage life and quality.

5. Investigation of Canned Maine Sardines: This cooperative project with the Maine Sardine Packers Association was started toward the end of last fiscal year. The ultimate goal is to develop tentative grade standards for Maine sardines shortly after the end of this calendar year. Results of plant surveys, experimental packs, and consumer surveys will be used as criteria for establishing tentative grade standards. At the same time practice recommendations for the industry will be developed. Field headquarters for the project are in Boothbay Harbor, Maine.

6. Manual on the Refrigeration of Fish: The North Atlantic Technological Research unit has been assigned the task of completing this manual. Some information on certain parts of the manual is completed in rough draft. A refrigeration engineer will be employed to write those sections of the manual dealing with specialized refrigeration machinery, cold-storage warehouse layouts, efficiency in plant operation, etc., while other sections of the manual will be assigned to various Technological Section personnel.

### MIDDLE AND SOUTH ATLANTIC (COLLEGE PARK, MD.):

1. Development of a Dried Product from Condensed Menhaden Solubles or Stickwater: Experimental work should be concluded in about 3 months and the general results should be ready for publication in about 4 months. Satisfactory straight drum-dried products have been made from about one-third of the samples



of condensed menhaden solubles which have been collected. The other dried products were too hygroscopic to be satisfactory.

Certain chemical additives have been tried but none was satisfactory. A final test will utilize inert additives with high absorption qualities to produce concentrates containing a high proportion of condensed solubles. An extensive statistical analysis will be made of data on physical and chemical qualities of the solubles in order to determine what changes in processing can be recommended to produce solubles which can be dried easily.

2. Nutritive Value of Fishery Products--Biological and Chemical Studies: Concern has been expressed by both producers and consumers as to apparent differences in the nutritive value of the protein of fishery byproducts. These differences may not be important under practical feeding conditions, but the reasons for the apparent differences should be determined as soon as possible. Feeding studies with chicks, using experimental low protein and practical broiler diets, have been and will continue to be carried out. Preliminary investigations at College Park and in cooperation with the staff of the Seattle laboratory will be made to develop simple chemical indexes of nutritive quality of fishery byproducts if variability exists to any important degree.

Work will be continued to determine the nutritive value of fish flours prepared for human consumption, and certain processed or prepared byproducts, such as fish-meal press cake and pet foods.

Bioassays with rats and chicks will be continued to determine the amount of unknown growth factor or factors in samples of fish meals, condensed solubles, and concentrates. This work is carried out in cooperation with the Seattle laboratory staff. The results should indicate what processing factors are important in insuring the high nutritive quality of fishery byproducts.

3. Comparison of Nutritive Value of Fish and Meat (Cooperative Project with the University of Maryland): A series of

metabolism studies have been conducted with the cooperation of the College of Home Economics, University of Maryland, in which two comparable groups of girls have eaten a basal diet low in protein and have eaten either fish or beef as supplemental animal protein. The studies have included analyzing all food consumed, metabolic products which have been excreted, and samples of venous blood collected at regular intervals. The data indicate no difference in the nutritive value of the two animal proteins.

A new test will be started this fall in which the diets will contain much lower levels of protein in order to determine if either animal protein is more efficient when consumed at levels just permitting a positive nitrogen balance. A nontechnical article will be prepared by early fall to summarize the more important data collected to date.

4. Changes in Texture of Frozen Blue Crab Meat (Cooperative Project Sponsored by the Refrigeration Research Foundation): A graduate student in the Department of Chemistry of the University of Maryland studied this problem several years ago and found certain indications that enzymes may be active in frozen crab meat. Very little work was done this past year since there was no fellowship student available for the project. The project has now been transferred to the Department of Zoology and a graduate student will begin a study this fall on the comparative histology and physiology of meat taken from freshly-killed crabs, cooked crabs, and meat that has been stored frozen for various periods of time. The results should indicate what changes are taking place in the meat and probable reasons for the changes.

5. Feeding Studies with Irish Moss Gums: Animal-feeding studies have been completed. Data on the histological studies of the test animals are being collected on a contract basis by the University of Maryland. As soon as the results of the histological work become available a manuscript will be prepared for publication.

PACIFIC COAST (SEATTLE, WASH.):

1. Nutritive Value of Fishery Products--

Chemical and Microbiological Studies: Emphasis on this project will be shifted during the year to a study of the chemical changes responsible for the wide variation in the nutritive value of different batches of fish meal. With variation in nutritive value of different meals of as much as three times, or more, it is important to have available a quick laboratory test to appraise the nutritive value. The first step in development of such a test is a study of the chemical or other changes occurring which cause such differences in nutritive value. Work on this portion of the project will get under way during the winter.

Tests on the vitamin content of fish meals will be completed shortly and reports will be prepared. Work will also be carried out on unidentified growth factors in fish meals, with particular emphasis on determination of the content of such factors in different meals and correlation of a microbiological test with animal-feeding tests. This latter phase of the project is being conducted in collaboration with the Service laboratory at College Park.

2. Chemical Evaluation of Fish Oils and Investigation of New Uses: Improvement in marketing fish oils depends upon development of new uses which will take advantage of their special chemical characteristics. Work which is being carried out on menhaden oil will be continued in two phases. In the initial phase, reactions involving the pure chemical fatty-acid constituents of fish oils are being studied to find out how such reactions can be controlled, and to study the chemical characteristics of the resulting compounds. As this preliminary information is assembled on each type of reaction of the pure components making up the oil, the work is then translated to similar reactions using the fish oil as a starting material in place of the pure chemical compounds.

3. Cold-storage Life of Fish (Cooperative Project Sponsored by The Refrigeration Research Foundation): Include studies on cold-storage life of Pacific oysters and methods of improving the storage life of certain species of fresh-water fish. Both of these studies are financed in part from funds provided by The Refrigeration

Research Foundation. Work on the Pacific-Coast-oyster phase of the project will include a determination of the effect of season at which the oysters are taken on storage characteristics, including drip formation. Excessive drip formation is a serious problem in marketing frozen Pacific oysters. Previous work carried out by the Service has shown that frozen chub and sheepshead have poor storage life when handled by conventional methods. An attempt will be made to find improved methods of storing these species.

4. Composition of Fish: Work will be carried out largely on the proximate composition of Pacific oysters and fresh-water fish, on which data are quite meager. Such data are needed for background information in connection with processing these species both for food and for by-products. The data are also of value to nutritionists. Work during the coming year will be limited largely to samples being obtained in connection with the project on cold-storage life of fish.

5. Fish Sticks--Voluntary Quality Standards and Storage Characteristics (Pacific Coast): Information required for setting up voluntary quality standards for fish sticks will be assembled. Work will be carried out to adapt rockfish for use in the production of fish sticks. This species is at present considered less desirable than cod or similar species because of the layer of dark meat occurring just beneath the skin. Storage tests to determine the cold-storage life of fish sticks prepared from various species of Pacific Coast fish will be carried out.

6. Canned Tuna Discoloration (Cooperative Project Sponsored by the Continental Can Co.): Work will be continued to elucidate the mechanism of the reaction between sulfur in tuna and iron in the can, which sometimes causes severe economic losses owing to the formation of black iron sulfide in the canned product. Work during the past year has shown that the source of the sulfur entering into this reaction is high-molecular-weight proteins rather than spoilage-breakdown compounds. Work will be carried out on the mechanism whereby, in some cases even when considerable sulfide is available, it does not react with iron from the can to form the discoloration.



7. Determination of Oil in Fish Meal (Cooperative Project with the Association of Official Agricultural Chemists): Work will be continued on efforts to improve upon the accuracy and simplicity of the official AOAC procedure for the determination of the oil content of fish meal.

#### ALASKA (KETCHIKAN):

1. Cause of Texture Change of Canned Salmon Prepared from Frozen Fish: Experimental work was completed. Final reports covering (1) the use of acid and brine dips for the reduction of curd in canned salmon prepared from frozen salmon, and (2) the effect of pH and salt content on curd formation are being prepared for publication.

2. Food Products from Alaska Fish: Studies to assist in the development of "off-season" fishery industries in Alaska will be continued. Several reports covering previous experimental work with new products will be completed and released for industry use. In the planned experimental work more emphasis will be given the problems of quality loss and spoilage during the preparation and storage of fishery products. Initially, smoked salmon products and canned king- and dungeness-crab meat will be studied.

3. Pharmaceutical and other Industrial Products from Salmon Eggs--Part II--The Fatty Acids of Salmon-Egg Oil: Previous research has shown that salmon eggs have considerable promise for the development of valuable byproducts from both the protein and oil components. Further work will continue on the composition of the salmon-egg oil in order to separate and identify more completely the long-chain unsaturated fatty acids. The findings are being correlated with the latest developments in vegetable and animal oils and will provide the basis for additional research and application in other fish oils.

4. Determination of Chemical Changes in Fish Protein during Freezing and Storage: Chemical changes occurring in the protein of fish during freezing and storage are evidently related to the gradual development of undesirable flavor and texture characteristics. Methods of ob-

jectively measuring the rate and extent of these changes are needed in order to better study the effect of variables in fish handling, freezing, and storage. Such findings could then be applied to the development of improved processing procedures and would be of great value in establishing objective quality standards for frozen fish.

Present research will continue on the relationship between the solubility and viscosity properties of isolated fish actomyosin systems (comprising about 75 percent of the total fish protein) that have been subjected to frozen storage. Attention will be given to the application of newer biochemical techniques for separating and measuring the active protein components.

5. Processing and Evaluation of Crab Meat Packed in Hermetically-Sealed Containers: High-quality standards are of greatest importance in the preparation and storage of refrigerated hermetically-sealed food products. The most desirable characteristics of fresh crab meat are best preserved by such preparation. Previous studies have shown the best procedures for freezing, packaging, and storing the crab meat. Additional study is desirable on the relation of processing problems and the effect of transition storage temperatures above 32° F. to the quality of the final product at the consumer level.

The bacteriological and chemical factors causing this quality loss, as well as the effect of handling procedures, will be studied.

#### DEPARTMENTAL (WASHINGTON, D.C.):

1. Federal Specification for Fishery Products: Proposed revisions for Federal Specification PP-S-311a (Shrimp; Canned) and PP-S-316a (Shrimp, Raw and Cooked; Chilled and Frozen) were scheduled to be resolved with Industry in July. Initial drafts on the specifications PP-C-651 (Crabmeat; Canned) and PP-C-656 (Crabmeat; Fresh) will be completed. The next project will involve revision of the specification PP-S-51b (Sardines; Canned).

#### 2. Review of Publication Methods:

Reevaluation will be made of current methods of issuing progress reports and research reports on technological projects in order that the information may be more readily available to the industry.

Initial consideration will be given to expanding the section "Research in Service Laboratories" in Commercial Fisheries Review to provide currently more detailed information on the progress on research projects.

#### TECHNOLOGICAL SECTION ORGANIZATION CHART

Branch of Commercial Fisheries, U. S. Fish and Wildlife Service  
U. S. Department of the Interior  
Washington 25, D. C.

##### Washington, D. C.

<u>Name</u>	<u>Title</u>	<u>Interior Bldg. Room Number</u>	<u>Telephone</u>
Charles Butler	Chief, Technological Research	3350	{ Republic 7-1820 Ext. 4745
Frank T. Piskur	Asst. Chief, " "	3352	

##### Field Laboratories

<u>Activity</u>	<u>Location</u>	<u>In Charge</u>	<u>Telephone</u>
North Atlantic Technological Research	61 Summer St. East Boston, Mass.	Joseph F. Puncochar	East Boston 7-4307
Middle & South Atlantic Technological Research	P. O. Box 128 College Park, Md.	Hugo W. Nilson	Warfield 7-5800
Pacific Coast Technological Research	2725 Montlake Blvd. Seattle, Wash	Maurice E. Stansby	East 0586
Alaska Technological Research*	622 Mission St. Ketchikan, Alaska	John A. Dassow	540

\* Sponsored jointly by the U. S. Fish and Wildlife Service and the Fisheries Experimental Commission of Alaska (J. W. Mendenhall, Chairman; John A. Dassow, Secretary).



#### THAWING FROZEN WHALE MEAT

Whale meat gives an excessive amount of drip on thawing. Frozen whale meat brought to Japan from the Antarctic Ocean was defrosted by the following methods: in air, in water, by Joule's heat, and by dielectric heating. Dielectric heating appeared to be the best method since the quality of the defrosted product most nearly resembled that of the original raw meat. Defrosting in still air has some practical value.

--Food Science Abstracts, May 1953.





# TRENDS AND DEVELOPMENTS

## Additions to the Fleet of U. S. Fishing Vessels

A total of 83 vessels of 5 net tons and over received their first documents as fishing craft during April 1954--21 more than in April 1953. Texas led with 17 vessels, followed by Florida west coast with 14 vessels, and Louisiana with 11 vessels.

During the first 4 months of this year, 272 vessels received their first documents as fishing craft, compared with 187 during the same period in 1953. The gain in documentation during the first four months of 1954 occurred almost entirely in the Gulf States where 153 vessels were added to the fleet as compared with 65 in the same period in 1953. Most of the vessels documented in the Gulf States are shrimp trawlers.

Vessels Obtaining Their First Documents as Fishing Craft, April 1954  
and Comparisons

Section	April		Four months ending with April		Total 1953
	1954	1953	1954	1953	
	Number	Number	Number	Number	Number
New England .....	5	1	8	3	20
Middle Atlantic .....	2	2	2	6	19
Chesapeake .....	5	6	28	23	83
South Atlantic .....	9	10	32	29	116
Gulf .....	45	15	153	65	264
Pacific .....	15	19	37	40	164
Great Lakes .....	-	3	3	5	7
Alaska .....	1	6	8	16	53
Hawaii .....	1	-	1	-	3
Total .....	83	62	272	187	729

Note: Vessels have been assigned to the various sections on the basis of their home port.



## Alaska

**SALMON RESTORATION PROGRAM LAUNCHED:** Clarence L. Olson, General Manager of the Pribiloff Islands fur-seal operations has been detailed to launch the Alaska Salmon Restoration Program of the Fish and Wildlife Service, the Secretary of the Interior announced in May.

The program is directed toward reversing the downward trend of the salmon catch and to revitalize the salmon industry, which is the most important in the territory.

Conservation measures include complete closure of certain important areas where depletion has reduced runs so there is no surplus beyond spawning needs. In other areas where depletion is less pronounced, trap fishing has been cut 50 percent and seining zones have been closed to increase escapement to give salmon a chance to reach spawning grounds. Fishing intensity has been curbed where there is evidence of declines.

Governor B. Frank Heintzleman has reported to Secretary McKay that salmon cannery operators and fishermen are whole-heartedly supporting the program. Olson will be the immediate representative of Director John L. Farley of the Service on the program and will work with the Service's regional staff in the territory.



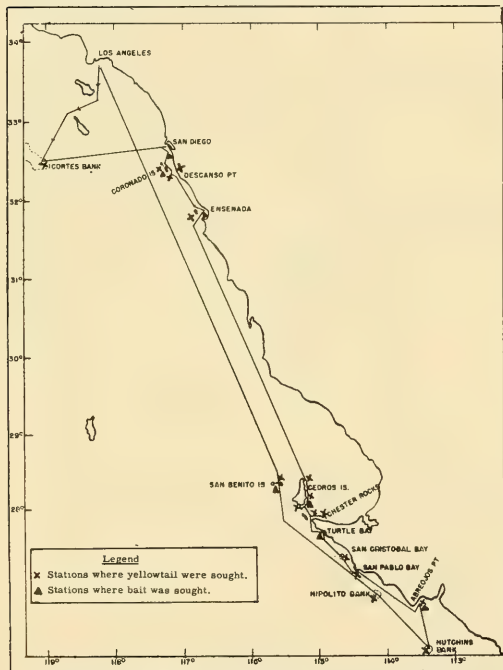
## California

**MORE YELLOWTAIL TAGGED BY "YELLOWFIN" (Cruise 54-Y-5):** A total of 116 yellowtail was tagged and released off the north end of Pecks Channel, San

Benito Islands, by the California Department of Fish and Game's research vessel *Yellowfin* on a 15-day cruise completed at Los Angeles on May 12. The fish were single tagged using jaw tags and vinylite tubing tags alternately in groups of ten--60 jaw tags and 56 tubing tags were used. Scale samples were kept from 67 of the tagged fish.

Yellowtail fishing was tried at 16 places as shown on the accompanying chart. No yellowtail were taken nor were there signs of fish being present along the whole coast until the vessel reached the San Benito Islands on the return trip. Commercial fishermen were also finding the fishing very slow. The water was extremely murky and at most places objects could not be seen more than a few feet below the surface.

Night light stations were made at seven localities, as shown on the chart, in efforts to keep a maximum supply of good bait. We were successful at Ensenada Harbor only, where 42 scoops of small anchovies were taken in the blanket net. At other stations only a few smelt or nothing at all were attracted to the 1500-watt light.



Cruise 54-Y-5 of the M/V *Yellowfin*, Apr. 27-May 12, 1954.



## Cans--Shipments for Fishery Products, January-April 1954



Total shipments of metal cans for fish and sea food during January-April 1954 amounted to 20,476 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 22,520 short tons for the same period last year.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reports in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.



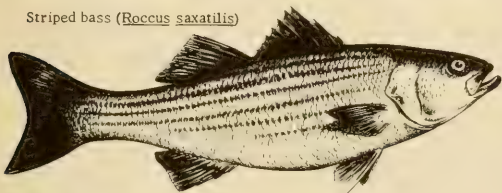
## Cooperative Federal-State Striped Bass Research

Seven Atlantic Coast states have joined in a cooperative Federal-State striped bass research program to obtain information needed for the development of improved management of striped bass with the aid of Dingell-Johnson Federal Aid funds. The states--Massachusetts, Connecticut, New York, New Jersey, Maryland, South Carolina, and Florida--and the U. S. Fish and Wildlife Service have under way, or will set up soon, programs budgeted at approximately \$190,000 over the next three years, announces the New York Division of Fish and Game.

The securing of necessary equipment such as tags, nets, etc., is already in progress. Field work on the project started April 1.

The cooperative striped bass project is one of the most detailed and extensive investigations of a marine species of interest to the sport fishermen ever undertaken on the Atlantic Coast. The information obtained will greatly increase the knowledge of the striped bass and provide a sounder basis than now exists for establishing better management policies.

Striped bass (*Morone saxatilis*)



No fishery problem has more embroiled the Conservation agencies, sport fishermen, and commercial fishermen of the Middle and North

Atlantic States in recent years than the management of the striped bass. The controversy has been fostered by the scarcity of information on the habits, movements, and biology of this important migratory species.

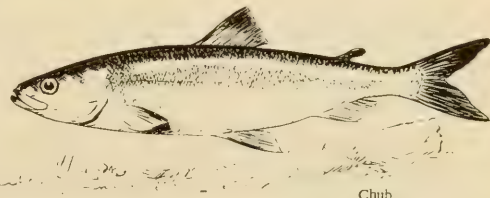


## Great Lakes Fishery Investigations

### TRAWL FISHING FOR CHUBS TESTED IN LAKE MICHIGAN BY "CISCO"

(Cruises I and II): Trawling operations in southern Lake Michigan were carried out by the Service's research vessel Cisco to determine the composition and distribution of chub populations and to test various trawl designs for use in chub fishing on a commercial scale. The cruises were part of a fishery and limnological survey of southern Lake Michigan.

Collections made during the first cruise (May 6-18) reveal that the bloater (*Leucichthys hoyi*) dominates the chub population at all depths and is particularly abundant at depths of less than 30 fathoms. Trawling was found to be a successful method of sampling chubs. Results of fishing trawls of various designs indicate that the ability of a trawl to catch chubs in quantity depends upon the right combination of mesh sizes in the wings, body, and cod end. The outcome of initial trials were encouraging, and it appears that a trawl can be designed that can harvest chubs in quantity.



Hydrographic transects were made from Holland to Racine, and from Milwaukee to Grand Haven, the latter transect run twice during the cruise. Experimental gill

nets were set at 25 and 50 fathoms off both Grand Haven and Racine. A set at each depth and location consisted of 600 feet of nylon net (2 1/2- to 3-inch mesh) and 1,275 feet of linen net (2 3/8-, 2 1/2-, 2 5/8-, 2 3/4-, and 3-inch mesh). The linen nets are made according to the same specifications as those used by the research vessel Fulmar in the early 1930's and are being set in the same locations. Experimental trawling was carried on with trawls of various designs in the areas between Grand Haven and Holland, and between Racine and Milwaukee. Deep-water trawling was done between Grand Haven and Racine.

Limnological studies revealed that the open water of southern Lake Michigan is nearly homothermous near 4° C. from surface to bottom. A current moving north along the east shore 1/3 to 1/2 mile wide is sharply defined in both temperature and turbidity from open-lake water. A similar current (probably flowing south) on the west shore is indistinctly separated from open-lake water. Water near each shore is up to 5° C. warmer than that of the open lake and shows varying degrees of thermal stratification.

On the second cruise (May 25-June 7) progress was made in harvesting and sampling chubs with trawls. It appears that a cod end of relatively small mesh is necessary to capture even the larger chubs.

Two transects were made across Lake Michigan and another was run along the east shore from Whitehall to Ludington. A total of 9 hydrographic stations were visited along the transects. Experimental gill nets were set at two depths off Grand Haven. Trawling was done off Grand Haven and Ludington and in the area between Milwaukee and Port Washington. Bathythermograph casts were made at 30-minute intervals along the transects and at all stations. In addition, a 12-hour intensive limnological and trawling study was made off Grand Haven.

Toward the end of the cruise the water of southern Lake Michigan began warming and stratifying rapidly, especially near the east shore. The intensive limnological study produced data on the vertical movements of *Pontoporeia* (*Mysis relicta*) and chub (*Leucichthys*) fry, and other organisms. The intensive work also included the collection of valuable physical and chemical data on the water of various depths.



## Gulf Exploratory Fishery Program

YELLOWFIN TUNA DISCOVERED IN GULF BY "OREGON" (Cruise 23): The first yellowfin catches of any significance in the Gulf of Mexico were made by the Service's exploratory fishing vessel Oregon on a six-week cruise during May and June. More than 3,000 pounds of yellowfin tuna were unloaded at Pascagoula, Miss., when the vessel completed the 2,500-mile cruise in mid-June.

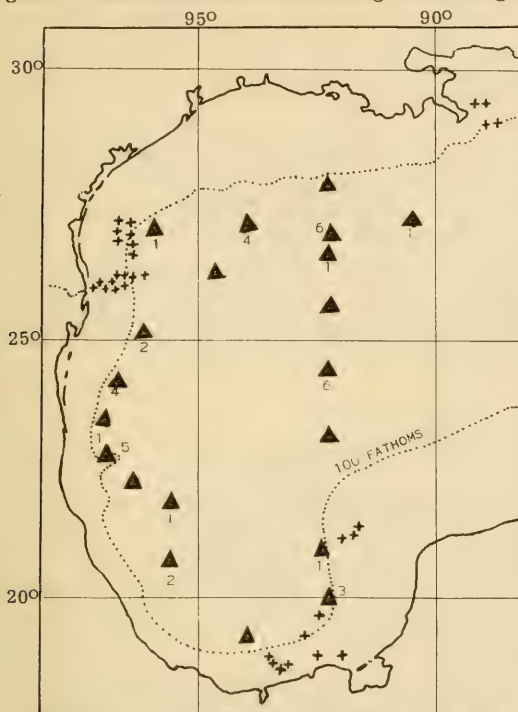
Of considerable significance is the fact that the tuna averaged 118 pounds each, an above-average weight for this species. Yellowfin tuna, moreover, were found over a wide expanse of the western Gulf, thus indicating a broad distribution at this season of the year.

The mature tuna taken during the cruise were in spawning condition, and many specimens of small yellowfin were collected. Fishery biologists aboard the Oregon concluded that the species may be found regularly in western Gulf waters.

The large yellowfin tuna (73 to 168 pounds each) were taken on 14 out of 20 sets made with a modification of Japanese-type long-line gear. Each set of 26 nine-hook baskets was made in the early hours of the morning at a predetermined place without regard for the presence or absence of surface signs of tuna. Furthermore, each set was made with hooks fishing at graduated depths from 5 to 45 fathoms. Of 37 yellow-



fin caught, 10 were damaged by sharks, and 2 were lost because of poor hoisting gear. It was found that shark damage could be greatly reduced by avoiding disposal



▲ Approximate position of long-line sets (figure indicates number of yellowfin tuna caught at station).

+ Approximate position of shrimp-trawl drags.

Cruise 23 of the M/V Oregon, May-June 1954, in the Western Gulf of Mexico.

vessel A. A. Jakkula between Brownsville and Aransas Pass, Texas, from June 3 to June 6. The A. A. Jakkula made oceanographic studies of conditions while the Oregon made shrimp-trawl drags.

The Oregon departed Pascagoula July 10 on Cruise 24 which will be devoted to long-line fishing for tuna. The area to be explored will be the deep-water section of the northeast Gulf of Mexico--the area with depths of 500 fathoms or more north of Latitude 26° and east of Longitude 90°.

Among the objectives will be finding the best times of day or night for tuna long-line fishing in the Gulf and finding whether better fishing results can be obtained with use of electronic fish-locating instruments. Since less travel time will be necessary than on the preceding cruise, more gear will be used. It is planned to set a total of 70 baskets (630 hooks, or about 12 miles of line) daily. The cruise was due to be completed on July 27.

of used bait while fishing and by chumming-up and shooting the more persistent sharks. In addition to the yellowfin, 1 blackfin tuna, 1 wahoo, 1 three-foot broadbill swordfish, several marlins of more than one species, 6 sailfish, 2 sharks, and several alepisaurids were caught on the long lines. Due to breakage of the leaders or gangions, 39 hooks were lost.

Arrangements were made to have some of the tuna tested at Government laboratories and commercial canneries for quality evaluation.

The tuna catches made during the cruise were intended only to indicate distribution. No attempt to estimate the number of tuna in any one location was made. Plans have been formulated, however, for a cruise to the better fishing areas for a determination of the quantities in which Gulf yellowfin may be caught.

In addition, during the cruise shrimp drags were made on the northwest part of the Campeche Bank and in the 200- to 250-fathom depth range in the southern part of the Gulf of Campeche. The catches were poor.

The Oregon worked together with the Texas A & M research



## North Pacific Exploratory Fishery Program

SUMMER COMMERCIAL FISHING EXPLORATION IN PRINCE WILLIAM SOUND BY "JOHN N. COBB" (Cruise 20): In order to investigate whether shrimp, king crab, and bottom fish are present in the Prince William Sound area in commercial quantities during July and August, the Service's exploratory fishing vessel John N. Cobb was due to sail from Seattle, Wash., on July 6. The vessel is due to return to Seattle on or about September 3.

There is a real need for development of new fisheries in the Sound because of recent failures of the salmon runs. Requests to explore the area in this regard have been received from fishermen's organization and industry members, especially in the Cordova area. This is the second trip to the region for this purpose; the previous trip was made during the late winter and early spring of 1954.

Various types of gear will be fished--beam trawls, otter trawls, shrimp traps, and king-crab pots. Electronic equipment, such as recording depth finders and an underwater scanning device, will be used to determine bottom characteristics and to assist in locating fish. Oceanographic observations including water temperatures, salinities, and bottom samples will be made at each fishing station.



## Pacific Oceanic Fishery Investigations

HALIBUT VESSELS FISH FOR TUNA NEAR EQUATOR: Two Northwest Pacific halibut long-line fishing vessels sailed from Honolulu late in May for the equator to fish for tuna, reports the Service's Pacific Oceanic Fishery Investigations. The vessels are of 15-ton capacity and carry a 3-man crew; they expect to operate out of Palmyra as far south as the equator. The vessels, outfitted with steel wire cable for the main line of their long-line gear, expect to operate with a larger vessel scheduled to arrive at Palmyra in mid-June. A Service biologist is with one of the vessels and will keep detailed records of the expedition.

Should this expedition be successful in tuna fishing operations at the equator, a fleet of about 30 to 40 halibut vessels will fish for tuna in the central Pacific this fall.

\* \* \* \* \*

GOOD TUNA FISHING REPORTED AND NEW LONG-LINE GEAR TESTED IN LINE ISLANDS AREA BY "JOHN R. MANNING" (Cruise 20): Tuna fishing in the Line Islands area was found to be good on a 6-week exploratory cruise by the Service's research vessel John R. Manning. The vessel unloaded 10½ tons of frozen yellowfin tuna (40 to 150 pounds each) at Honolulu on June 23. The fishing was best in the vicinity of Fanning Island, where catches as high as 14 tuna per 100 hooks fished were recorded. Tuna fishing was also good around Jarvis Island, an area that was being explored as tuna long-lining grounds for the first time.

Long-line fishing at 27 stations with 48 to 60 baskets of gear set each day produced a total of 426 yellowfin (of which 80 were shark-eaten), 17 big-eyed tuna, 8 skipjack tuna, 7 albacore tuna, 13 marlin, and 414 sharks. On 6 stations the standard cotton gear caught more than 6 tuna per 100 hooks. The best day's catch, near Fanning Island, yielded 14 tuna per 100 hooks on the standard gear.

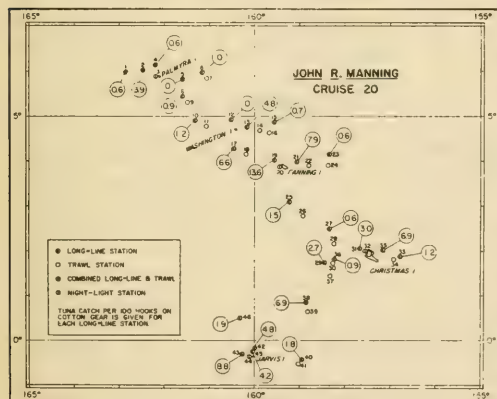
The cruise provided an opportunity for the first intensive field tests of a new type of tuna long line which has a stainless steel main line in place of the usual cotton line. This steel line is wound continuously on a powered reel, instead of being



hauled aboard in sections by hand, as is the case with the long lines used by commercial fishing vessels at present. The new gear was much easier and faster to handle and required less manpower than the conventional cotton lines. Some difficulty was experienced with the new steel long-line gear, in that many branch lines on which tuna were hooked, broke and released the fish. Further work will be done to search out and remedy the cause of this weakness before this promising new fishing implement is given more intensive trials in the field.

Twenty to 30 baskets of steel long line were fished each day. This gear was handled with much less effort than the standard cotton line, and even with the abundance of sharks in the area developed very few bad kinks or tangles. There was an unusually large loss of droppers from the steel line, however, which reduced the catch by this gear. The average catch rate for the steel gear (2.3 tuna per 100 hooks) was not as good as obtained on the cotton gear (3.2 tuna per 100 hooks). It is believed that the difficulty is relatively minor and can easily be overcome by further experimentation.

Also employed for the first time was a new type of midwater trawl, an ingenious net which is towed behind the ship at the depth where the large yellowfin tuna are believed to feed, that is, at 300 to 400 feet below the surface of the ocean. The object is to capture samples of the small fish, squid, and shrimp upon which the tuna feed, and the new 6-foot trawl successfully collected large numbers of interesting deep-sea organisms at the 19 locations where it was used.



Two biologists spent two days at Christmas Island, where POFI maintains weather instruments and a recording sea-temperature thermometer. The Gilbertese natives who tend these instruments were given fresh supplies of charts and spare parts; the instruments themselves were checked, and the data recorded since the vessel's last visit were brought back to Honolulu.

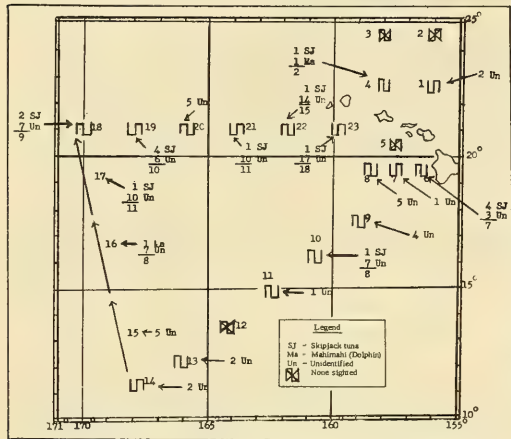
Other minor missions of the cruise were the recovery of the Bishop Museum's wood samples left in the ocean at Christmas Island to study the effects of boring organisms there; the collection of hermit crabs from several of the Line Islands for the University of Hawaii; and the collection of snappers and other species of fish suspected of being poisonous at Palmyra, Washington, Fanning, and Christmas islands for a California doctor of medicine who is making a study of the poisonous fish problem throughout the Pacific.

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**TUNA SCHOOLS PLENTIFUL IN HAWAIIAN AREA REPORTS "HUGH M. SMITH"**  
(Cruise 26): Skipjack tuna (aku) were found approaching their seasonal peak of abundance in Hawaiian waters by the Service's research vessel Hugh M. Smith on a month-long series of tuna-scouting cruises completed at Honolulu on June 19. The vessel covered a radius of 800 miles around the Islands. Bird flocks, the indicators of tuna schools to commercial fishermen and scientific observers alike, were most numerous about 40 miles south of Kauai, and thus within the range of the Oahu fishing

fleet, but the flocks in that area were small. The biggest flocks, estimated to have contained 400 to 500 birds, were seen far to the south in the vicinity of Johnston Island.

During 23 scouting days, 126 bird flocks and fish schools were sighted; 16 of these were identified as skipjack tuna, 2 as dolphin (mahimahi), and 108 were unidentified. Only one school of skipjack tuna was unattended by birds. In scouting the southern sector, bird flocks were encountered at all but 2 of 19 stations and as far as 840 miles southwest and 720 miles west of Oahu (the farthest stations during this cruise). No flocks were seen in the lee of Lanai nor at a station approximately 550 miles southwest of Oahu. Only 4 bird flocks were observed during 4 scouting days in the region north of Oahu and all were seen at the 2 stations closest to land. The greatest number (18) of bird flocks sighted in one day was in an area approximately 40 miles south of Kauai, although these flocks were composed of small numbers of birds.



Cruise 26 of the Hugh M. Smith; bird flock and fish school sightings.

movement of schools into the local fishery, especially in the case of schools observed within 250 miles of land.

Among the schools identified as skipjack tuna, those in the areas south of Oahu were composed of large skipjack (18 to 20 pounds), while those to the west of Oahu were mostly small, in the 3- to 5-pound size range. A total of 22 large skipjack tuna were tagged and released in viable condition with the California-type plastic tube tags.

Twenty-one standard hydrographic stations were occupied concurrently with scouting in the areas south, southwest, and west of Oahu. Chemical nutrients were observed and a zooplankton haul was taken at each station. The GEK, measuring surface currents, was also operated in the lee of the islands, and BT lowerings were made at frequent intervals throughout the cruise. The correlation between these oceanographic conditions and the scouting survey within the same time and space may explain the variations in the numbers of bird flocks and fish schools.

The Captain of the Hugh M. Smith reported, as an item of interest to local flag-line fishermen, the sighting of a long set of Japanese tuna long lines at a position 840 miles southwest of Oahu and 350 miles south of Johnston Island. Judging from what is known about Japanese fishing in that area, it is believed that this gear was set primarily for the capture of big-eyed tuna.

\* \* \* \* \*

**TWO-VESSEL EXPEDITION CATCHES 107 TONS OF TUNA IN CENTRAL PACIFIC AREA ("North American" and "Alrita," 2nd Concurrent Cruises):** The two commercial vessels--North American and Alrita--landed a total of 107 tons of tuna from a second set of long-line fishing cruises in the central Pacific area. A Fish and Wildlife research biologist accompanied the vessels as an observer.

The vessels departed Kewalo Basin March 13 and began fishing on March 18. They continued fishing until April 7 at which time about 10 tons of yellowfin tuna were transferred from the North American to the Alrita. The latter departed on that day for Honolulu with a full load of tuna and arrived on April 15. The North American continued to fish until April 28 and then departed for San Diego, California, arriving there May 15.

The North American landed 72 tons of tuna from her second trip; 1,728 yellowfin, 8 big-eyed, 64 skipjack, 8 albacore; in addition 41 black marlin, 511 sharks, and 19 other miscellaneous fishes were caught. The Alrita landed 35 tons of tuna, consisting of 689 yellowfin, 22 skipjack, 7 big-eyed, and 9 albacore; 216 sharks and 16 black marlin were also landed.

Forty stations were fished during this set of cruises by the North American and 20 stations by the Alrita. The first few days fishing were close to Palmyra Island and the second through the fourth were fished en route to Christmas Island. The remaining stations were fished near Christmas Island. The catch of yellowfin tuna varied considerably from station to station as was noted in their previous cruise.



## Research on Poisonous Fish

The department of ichthyology and herpetology of the School of Tropical and Preventive Medicine, Loma Linda, California, has entered into a new contract with the U. S. Armed Forces for continuing work on poisonous fish. The contract amounts to more than \$49,000, according to a June Bulletin from the Pacific Science Association.

The project has already included field investigations and collections at Cocos, Galapagos, La Plata, Palmyra, Las Perlas Islands, and Panama Bay. Studies of the ecology and food habits of poisonous fish were continued. During 1954 two major field trips are planned: one to Guaymas, Mexico, and the other to the Marshall Islands.

This work is in line with the Eighth Pacific Science Congress resolution asking that scientific organizations be encouraged to engage in research on poisonous fishes and to evaluate their relationship to the development of marine food resources.



## South Carolina

**MENHADEN INDUSTRY NEEDS DEVELOPMENT:** South Carolina derives some of its wealth-from-the-sea from menhaden. The menhaden fishery exceeds in magnitude all other single fisheries of the Western Hemisphere. Unlike its neighbors North Carolina and Florida, South Carolina contents itself with taking only a small share of this oceanic wealth. Just how many pounds of menhaden are taken in South Carolina waters is unknown. Official landings in the State run around one million pounds (value to the fishermen of \$10,000) annually, but fish caught in South Carolina and landed in other states possibly exceed this figure several times.

That South Carolina does not pursue this fishery with more energy perhaps lies in a peculiar quirk of nature. The menhaden fishery, now over a century old, came into its own as a fish-oil industry. Peculiarly enough, menhaden to the north and to the south are heavy oil producers, but those taken off South Carolina and Georgia produce only small amounts of oil. No one seems to have a satisfactory answer why



this is so. However, this lack of oil undoubtedly discouraged the start of a South Carolina fishery, according to South Carolina Wildlife (Spring 1954) of the South Carolina Wildlife Resources Department.

An ichthyologist would say that there are five different kinds of menhaden in North America. However, over 75 percent of the entire commercial catch is made up of one species--*Brevoortia tyrannus*. This is the species which commonly occurs in South Carolina waters. Most fish in South Carolina show a yellowish or greenish coloration around the fins and tail. Most South Carolina fish are up to eight inches long.



Briefly, menhaden are caught in purse seines which are operated from vessels ranging in size from 100 to 150 feet. These nets may be from 1,000 to 1,500 feet long and 50 to 90 feet in depth. One vessel can carry from 50 to 60 tons of fish.

In South Carolina the major portion of purse seining is done in Long Bay, that great indentation in the Carolina coast from Cape Fear, N. C., southward to Cape Romain in South Carolina. Fish caught in these waters usually are landed at Beaufort or Morehead City, N. C. Menhaden taken at sea from Charleston southward to about Port Royal Sound are brought in the North Edisto River Inlet and landed at a small factory located in Charleston County on the Dahhoo River.

Even as early as 1870, many people became alarmed at the enormous poundage of fish taken by the menhaden fishing fleet, and many people predicted that within a very short time the entire industry would disappear because of overfishing. From the vantage point of 75 years of fairly successful fishing, the menhaden industry now looks on these dire predictions as unfounded in fact. Although the catch records of menhaden have fluctuated up and down in this 75-year period, the over-all picture shows an increase in the actual number of fish taken. Although fishing intensity has increased, there is nothing to indicate that the supply of available fish is decreasing.

Just as alarm was expressed over the depletion of menhaden by overfishing, sportsmen and commercial fishermen have from time to time expressed the opinion that the operations of the menhaden fisheries were harmful to other fisheries, both sports and commercial. A series of scientific investigations beginning back in 1896, carried on both by Federal and State governments in the coastwise waters from Maine to Texas, have repeatedly shown that menhaden fishing is not harmful to the spawning grounds of commercial and sports fish and that the menhaden fishermen do not destroy large numbers of commercial and sports fish and shrimp. A recent investigation in Texas, extending over a period of four months during which 5,326,000 menhaden were taken, showed that the food fish and non-food fish (including conchs and jellyfish) taken amounted to about two-tenths of one percent of the menhaden caught.

It seems evident, therefore, that the commercial menhaden fisheries are not violating any of the principles of conservation except that the supply of menhaden in South Carolina is probably not being utilized to its maximum extent. As long as the market price of fish meal remains as high as it is now, it would seem logical that despite the scarcity of oil in southern menhaden, the fishery can be practiced economically and with a margin of profit. While little is known about the life history, the abundance, and the occurrence of this fish in South Carolina waters, there is

some evidence available which indicates that the menhaden is present in South Carolina waters the year around. Investigation might well prove that just as in North Carolina, menhaden are in sufficient abundance to support commercial fishing at least ten months out of the year. While South Carolina already derives some wealth from this marine resource, it seems possible that with proper investment, sufficient returns could be realized to expand considerably this fishery in the State.



## U. S. Canned Packs of Selected Fishery Products, 1953

**FISH ROE AND CAVIAR, 1953:** The United States pack of canned fish roe and caviar in 1953 amounted to 65,742 standard cases (48 one-pound cans), valued at

Table 1 - U. S. Pack of Canned Fish Roe and Caviar, 1953<sup>1/</sup>

Product	Plants Packing	Quantity	Value to Cannery	Avg. Cannery Price	States of Production and Number of Plants
	No.	Std. Cases <sup>2/</sup>	\$	\$/Std. Case <sup>2/</sup>	
<b>Roe:</b>					
Alewife .....	26	35,072	427,781	12.20	Md. 5, Va. 13, N.C. 8
Shad .....	7	2,330	181,393	77.85	Md. 1, Ore. 4, Calif. 2
Deep Sea .....	2				
Cisco .....	1	7,880	80,065	10.16	Mass. 2, Conn. 1, N.Y. 1
Herring .....	1				
<b>Caviar:</b>					
Salmon .....	3	4,614	547,053	118.56	N. Y. 3
Sturgeon .....	2				
Whitefish .....	3	1,613	90,322	56.00	N. Y. 2, Wisc. 1
<b>Total Edible Roe and Caviar ....</b>		51,509	1,326,614	25.75	
Salmon eggs for bait	9	14,233	486,230	34.16	Wash. 9
<b>Grand Total .....</b>	<b>3/48</b>	<b>65,742</b>	<b>1,812,844</b>	<b>27.58</b>	

<sup>1/</sup>Preliminary.

<sup>2/</sup>Cases of various sizes converted to the equivalent of 48 cans, each can with a net weight of 16 ounces.

<sup>3/</sup>Exclusive of duplication.

\$1,812,844 to the packer (table 1). Alewife roe accounted for 53 percent of the quantity packed and 24 percent of the value of the pack. When compared with the previous year, the 1953 pack was greater by 3 percent in quantity and 8 percent in value (table 2).

Table 2 - U. S. Pack of Canned Fish Roe and Caviar, 1943-53

Year	Quantity	Value to Cannery	Avg. Cannery Price	Year	Quantity	Value to Cannery	Avg. Cannery Price
	Std. Cases <sup>1/</sup>	\$	\$/Std. Case <sup>1/</sup>		Std. Cases <sup>1/</sup>	\$	\$/Std. Case <sup>1/</sup>
1953 <sup>2/</sup>	65,742	1,812,844	27.58	1947	52,432	1,641,228	31.30
1952	64,080	1,681,010	26.23	1946	58,192	1,905,638	32.75
1951	76,095	1,926,140	25.31	1945	36,795	948,042	25.77
1950	70,382	1,886,959	26.81	1944	55,677	824,197	14.80
1949	86,459	1,969,998	22.79	1943	59,884	1,044,582	17.44
1948	50,629	1,473,320	29.10				

<sup>1/</sup>Cases of various sizes converted to the equivalent of 48 cans, each can with a net weight of 16 ounces.

<sup>2/</sup>Preliminary.

The total average price for all canned fish roe and caviar in 1953 was \$27.58 per standard case as compared to \$25.31 in 1952 and \$17.44 ten years earlier. The average prices for the individual items in 1953 varied considerably.



## U. S. Production of Selected Byproducts, 1953

**FRESH-WATER MUSSEL-SHELL PRODUCTS:** The U. S. production of fresh-water mussel-shell buttons in 1953 amounted to 4,891,009 gross, valued at \$5,220,917

State	Buttons			Lime and Poultry Grit			Total Value to Mfrg.
	Quantity	Value to Mfrg.	Avg. Price Per Gross	Quantity	Value to Mfrg.	Avg. Price Per Ton	
	Gross	\$	\$	Short Tons	\$	\$	
Iowa, Pa., and Mo.	4,891,009	5,220,917	1.07	2/1,994	26,393	13.24	5,247,310
1/Preliminary. 2/Produced in Iowa.							

to the manufacturers (table 1). In addition, 1,994 short tons of lime, poultry grit, and polished shell, all valued at \$26,393, were produced by mussel-shell manufacturers. Compared with the previous year, the button production decreased 4 percent but the value to the manufacturer increased 18 percent.

Mussel-shell products were manufactured in 11 plants in Iowa and 1 plant each in Pennsylvania and Missouri.

Mussel shells purchased during the year amounted to 10,143 short tons, valued at \$462,679 to the fishermen. Shells were taken in nine states in the Mississippi River and Great Lakes regions. Tennessee was the leading producing state, contrib-

Year	Buttons			Other	Total
	Quantity	Value	Avg. Price Per Gross	Products 2/	Value
		to Mfrgr.		Value to Mfrgr.	to Mfrgr.
	Gross	\$	\$	\$	\$
1953 <sup>1/</sup>	4,891,009	5,220,917	1.07	26,393	5,247,310
1952	5,078,402	4,430,114	87	8,431	4,438,545
1951	4,534,759	3,805,352	84	40,309	3,845,661
1950	4,940,190	4,074,775	82	51,758	4,126,533
1949	4,720,239	3,696,452	78	71,251	3,767,703
1948	6,810,135	5,396,511	79	50,610	5,447,121
1947	8,254,000	8,166,000	99	4/	8,166,000
1946	9,669,580	6,527,758	68	101,820	6,629,578
1945	3/ 9,027,685	3/ 4,844,647	54	-	3/ 4,844,647
1944	8,024,609	4,306,353	54	122,550	4,428,903
1943	8,077,523	3,679,305	46	102,723	3,782,028

<sup>1/</sup>Preliminary.

<sup>2/</sup>Crushed shell lime, poultry grit, and cut shells.

<sup>3/</sup>Estimated.

<sup>4/</sup>Data not available.

uting 45 percent of the total quantity; Kentucky was next with 20 percent; followed by Alabama, 13 percent; Arkansas, 10 percent; Iowa, 4 percent; Indiana, 3 percent; Mississippi and Illinois, 2 percent each; and Wisconsin, 1 percent.



## U. S. Foreign Trade

**EDIBLE FISHERY PRODUCTS, APRIL 1954:** United States imports of fresh, frozen and processed edible fish and shellfish in April 1954 amounted to 76.7 million pounds (valued at \$19.7 million), according to the April United States Foreign Trade, a Department of Commerce publication (see table). This was an increase of 19 percent in quantity and 27 percent in value as compared with March imports of 64.3 million pounds (valued at \$15.5 million). Compared with a year earlier, April imports were up 32 percent in quantity and 30 percent in value.



Exports of processed edible fish and shellfish (excluding fresh and frozen) in April 1954 totaled 3.2 million pounds (valued at \$0.7 million)--a drop of 22 percent

UNITED STATES FOREIGN TRADE IN EDIBLE FISHERY PRODUCTS, APRIL 1954 WITH COMPARISONS						
Item	April 1954		April 1953		Year 1953	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 Lbs.	Million \$	1,000 Lbs.	Million \$	1,000 Lbs.	Million \$
IMPORTS: Fish & shellfish: Fresh, frozen & processed 1/	76,748	19.7	57,971	15.1	724,656	193.2
EXPORTS: Fish & shellfish: Processed 1/ only (excluding fresh and frozen)	3,232	0.7	5,664	1.1	58,920	14.4

1/ Includes pastes, sauces, clam chowder and juice, and other specialties.  
Source: United States Foreign Trade (Trade by Commodity), Summary Report FT 930, April 1954, U. S. Department of Commerce.

in quantity and 50 percent in value as compared with March exports of 4.1 million pounds (valued at \$0.7 million). April exports were also down considerably from a year ago--43 percent in volume and 36 percent in value.

\* \* \* \* \*

IMPORTS AND EXPORTS OF CERTAIN FISHERY PRODUCTS INCREASE IN 1954: Imports of tuna and tunalike fish during January-April 1954 showed considerable gains over the same period of a year ago, according to preliminary information compiled by the U. S. Fish and Wildlife Service from data collected by the Bureau of the Census. Fresh and frozen tuna imports increased 31 percent; tuna canned in brine, 55 percent; and bonito canned in oil, 41 percent. Tuna canned in oil, however, showed a decline of 73 percent but the quantity was relatively small as compared with the items showing increases.



Imports of groundfish and ocean perch fillets were 33 percent greater than those of the January-April period of 1953. Other fillets declined 7 percent.

Shrimp imports increased 17 percent in the first four-months' period of 1954. Fresh and frozen lobster imports were down 16 percent.

Canned sardines, not in oil, imported during January-April 1954 were about five times the quantity imported in the similar period of 1953.

Imports of fish meal were 20 percent greater than during the four-months' period of a year ago.

Exports of fish oils during January-April 1954 increased 83 percent above those of the comparable period of 1953. Canned sardines and mackerel exports declined considerably.



## Wholesale Prices, June 1954

Fresh fish landings were liberal in June, the demand for most fishery products was light, and wholesale prices for all fishery products were lower. The June 1954 over-all edible fish and shellfish (fresh, frozen, and canned) wholesale index was 97.4 percent of the 1947-49 average (see table)--6.1 percent less than the May index and 3.5 percent lower than a year earlier.



Substantially larger groundfish landings in New England during June and a light to moderate demand accounted for the 41.4-percent drop in the ex-vessel price for off-shore drawn large haddock at Boston. The market for fresh-water fish at New York and Chicago was weaker in June and prices were lower. Demand for western halibut and salmon at New York was very good and prices for these items were higher. The drawn, dressed, or whole finfish subgroup index for June was down 8.5 percent from May, but slightly higher (0.6 percent) than June 1953.

Fresh haddock fillet prices at Boston were down 30.2 percent from May to June; the fresh shrimp market continued to weaken and prices at New York were down 4.8 percent. These commodities caused the June fresh processed fish and shellfish in-

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, June 1954 and Comparisons

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, June 1954 and Comparisons								
Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices <sup>1</sup> / (\$)		Indexes (1947-49=100)			
			June 1954	May 1954	June 1954	May 1954	Apr. 1954	June 1953
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					97.4	103.7	105.7	100.9
Fresh & Frozen Fishery Products:					98.7	107.0	109.8	103.2
Drawn, Dressed, or Whole Finfish:					98.0	107.1	111.8	97.4
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.06	.10	59.8	102.1	76.6	87.1
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.33	.32	100.6	97.5	94.9	95.9
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.63	.54	140.5	120.8	120.2	108.4
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.43	.46	105.4	114.0	241.7	88.0
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.45	.61	91.0	123.3	313.5	104.1
Lake trout, domestic, No. 1, drawn, fresh	Chicago	lb.	.49	.39	99.4	79.9	166.0	106.5
Yellow pike, L. Michigan, rnd., fresh	New York	lb.	.38	.36	88.5	84.4	129.0	105.5
Processed, Fresh (Fish & Shellfish):					100.7	107.8	111.1	111.9
Filletts, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.22	.32	74.8	107.2	95.3	91.9
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.60	.63	94.8	99.6	109.1	117.0
Oysters, shucked, standards	Norfolk	gal.	4.63	4.75	114.4	117.5	117.5	111.3
Processed, Frozen (Fish & Shellfish):					97.6	104.5	99.4	106.5
Filletts: Flounder (yellowtail), skinless, 1-lb. pkg.								
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.39	.37	100.8	96.9	98.2	108.7
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.32	.34	100.4	105.1	102.0	79.0
Shrimp, lge. (26-30 count), 5-lb. pkg.	Boston	lb.	.29	.29	116.8	117.8	117.8	103.5
	Chicago	lb.	.55	.65	84.1	99.5	88.0	119.6
Canned Fishery Products:					95.4	98.8	99.6	97.5
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	case	18.70	18.70	99.1	99.1	99.1	104.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	case	13.25	14.20	95.5	102.4	102.4	92.4
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	6.95	7.70	74.0	81.9	87.3	71.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

<sup>1</sup>/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

dex to drop 6.6 percent. The June index for the fresh processed subgroup was 10.0 percent lower than a year ago due also to lower haddock fillet and shrimp prices.

Frozen shrimp prices were affected by a weak market and dropped 15.5 percent from May to June. Frozen fillet prices were also lower. As a result, the index for frozen processed fish and shellfish was down 0.6 percent from May to June. Compared with a year ago, the prices for shrimp and haddock fillets were down, while the prices for fillets of flounder and ocean perch were higher.

A drop in the canned tuna and Maine sardine prices in June was responsible for the 3.4-percent drop in the canned fishery products index. Compared with a year ago, lower canned salmon prices were offset somewhat by higher canned tuna and sardine prices and the index for canned fishery products this June was only down 2.2 percent.



#### WHO BUYS FROZEN FISH FILLETS?

Two out of every five urban families were buyers of frozen fish fillets in 1952, according to a recent survey made for the U. S. Department of Agriculture. This survey was made to obtain a basis for judging the potential market for some of the major frozen foods.

Fish fillets were included in the 12 frozen items listed in the survey. Canned fish were not among the 6 canned products.

Broken down by types of food storage facilities the survey shows that frozen fish fillets were purchased in 1952 by:

- 37 percent of families owning home freezers throughout 1952;
- 50 percent of families who purchased a home freezer in 1952;
- 46 percent of families having refrigerators with frozen food compartment;
- 43 percent of families with ordinary refrigerators;
- 26 percent of families without a refrigerator or home freezer.

There were 6,933 persons or consumers in the 2,040 families covered in the survey. The number of one-pound packages of fish fillets purchased were 1.6 per capita and 5.4 per family. Geographically, the percentage of families buying fish fillets were: Northeast States, 46 percent; North Central States, 47 percent; Southern States, 36 percent; and Pacific, Mountain, and Southwest States (combined), 35 percent.

The report contains many other details based on family income and regional differences as related to ownership of home refrigeration facilities. Copies of the report, Purchases of Frozen and Canned Foods by Urban Families as Related to Home Refrigeration Facilities, Marketing Research Report No. 60, can be obtained without charge from the United States Department of Agriculture, Agricultural Marketing Service, Washington 25, D. C.





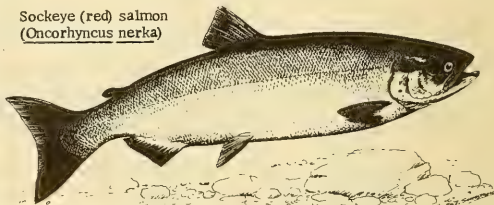
## International

### INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

**FRASER RIVER SOCKEYE SALMON 1954 REGULATIONS:** A summary of the recommendations for regulations governing the 1954 sockeye fishing season as approved by the International Pacific Salmon Fisheries Commission at Bellingham, Washington, March 13, 1954, follows:

**United States Waters:** 1. Controls by the Commission on fishing for sockeye in the United States waters embraced by the Treaty shall commence after 12:01 a. m., June 24, 1954, and shall continue until midnight September 30. Note should be taken, however, that no regulations are contemplated after September 6 except in cases of emergency to provide equal division of the catch between Canada and the United States.

Sockeye (red) salmon  
(*Oncorhynchus nerka*)



2. There shall be a weekly closed period of 48 hours' duration including Saturday and Sunday of each week in all United States Convention waters from June 24 until September 6 in the year 1954. The weekly 48-hour closure shall commence at 12:01 a. m. Saturday for purse seines and reef nets and at 6:00 p. m. Friday for gill nets.

**Canadian Waters:** 1. Controls by the Commission on fishing for sockeye in Canadian waters embraced by the Treaty shall commence at 12:01 a. m., June 24, 1954.

2. Controls by the Commission shall cease in Canadian Convention waters known as Areas 19, 20, 21, and 23 at midnight August 30, 1954, and in Areas 17 and 18 of District No. 3 and in District No. 1 at midnight October 14, 1954. Note should be taken that control of the fishing season in Areas 17 and 18 and in District No. 1 is not contemplated in the month of October except in case of emergency to obtain adequate escapement and equalization of the catch between the fishermen of the two countries.

3. There shall be a weekly closure of 48 hours' duration from June 24 to August 30 in Canadian Convention waters known as Areas 19, 20, 21, and 23.

4. There shall be a weekly closure in all other Canadian Convention waters of 78 hours' duration from June 24 to August 4; 96 hours from August 4 to August 25; 78 hours for the week end following August 25; 48-hour weekly closures from September 1 to September 16; and a continuous closure from September 16 to 8:00 a. m. September 27, subject to possible modification at the time of closure and subject to a period of 24 hours' fishing with nets not less than 8½-inches stretched measure if deemed necessary by the Department of Fisheries for the proper harvest of spring salmon.

(a) All weekly closures in District No. 1 will commence at 8:00 a.m. Friday.

(b) In that part of District No. 1 above Pattullo Bridge the weekly closure shall cease 4 hours later than in that part below Pattullo Bridge irrespective of the length of any of the above specified weekly closures.

**High Seas:** The Commission approved a regulation ordering a weekly closed period of 48 hours' duration from June 24 to August 30 for the year 1954 in all Convention waters in the High Seas west of Bonilla Point to the Tatoosh Island line.

**General:** The Commission declared that no one shall buy, sell, or have in his possession any sockeye salmon taken in any of the Convention waters during the time when fishing for such salmon is prohibited in such waters.

### NORTH PACIFIC FISHERIES COMMISSION

**BIOLOGY AND RESEARCH COMMITTEE MEETS IN TOKYO:** The standing Committee on Biology and Research of the International North Pacific Fisheries Commission convened in Tokyo, Japan, May 17 to 22, for a discussion of matters within its purview and referred to it by the Commission. The work of the Committee was of a planning nature, in preparation for the meeting of the Commission in October. The Committee, like its parent body, is tri-partite and composed of representatives of the United States, Canada, and Japan. The United States members are: Commissioner E. W. Allen, Dr. W. H. Thompson, and Dr. L. A. Walford, with C. E. Atkinson as consultant. The Canadian members are A. H. Needler and R. E. Foerster. The Japanese representatives are K. Suzuki, M. Fujinaga, and M. Ohto.

The opening session of the meeting was presided over by R. Takeuchi, Director, European and American Affairs Bureau, Japanese Ministry of Foreign Affairs, until recently Minister of the Japanese Embassy in Washington, according to the U. S. Embassy at Tokyo.

### NORTHWEST ATLANTIC FISHERIES COMMISSION

**FOURTH ANNUAL MEETING SCHEDULED:** The International Commission for the Northwest Atlantic Fisheries held its Fourth Annual Meeting in Halifax, Nova Scotia, at Commission Headquarters during the week of June 14. The Commission consists of representatives from ten American and European nations and is concerned with the investigation and conservation of the international fisheries off the New England, Canadian, and Greenland coasts. The United States Delegation consisted of United States Commissioners Bernhard Knollenberg of Chester, Conn., Francis W. Sargent, Director of Marine Fisheries for the State of Massachusetts, and Arnie J. Suomela, Assistant Director of the U. S. Fish and Wildlife Service; also advisors Lionel A. Walford, Herbert W. Graham, and William M. Terry of the Fish and Wildlife Service. Lawrence Rosen of the Usen Trawling Company of Boston attended the meeting as an observer on behalf of the Advisory Committee to the United States Commissioners.

### TRADE AGREEMENTS

**NORWEGIAN-ARGENTINE AGREEMENT INCLUDES DRIED COD:** A barter agreement recently concluded between Norway and Argentina provides for exports of 700 tons of dried cod from Norway and 28,700 boxes of apples from Argentina, according to the International News Survey.

## FOOD AND AGRICULTURE ORGANIZATION

**FISH MARKETING TRAINING CENTER IN HONG KONG:** The Food and Agriculture Organization has been invited by the Governments of the United Kingdom



Fishing junks at Aberdeen, fishing port of Hong Kong.

and Hong Kong to hold a training center in fish marketing in Hong Kong from July 12 to August 21 this year under the Expanded Technical Assistance Program. It is proposed to hold lectures in all phases of fish marketing, and seminars on fish-marketing problems will be a special feature. It is hoped in the seminar to review the marketing situation in the countries of the participants and discuss possible improvements which might be effected in the light of the information exchanged. Lecturers are being provided by the Hong Kong Government and by

FAO, and there will be demonstrations in the well-organized and efficient fish market and fish-marketing system which have been developed in Hong Kong.

\* \* \* \* \*

**TURKEY BECOMES MEMBER OF MEDITERRANEAN FISHERIES COUNCIL:** The Government of the Republic of Turkey has deposited with the Director-General of the Food and Agriculture Organization of the United Nations, an instrument of acceptance of the Agreement for the Establishment of the General Fisheries Council for the Mediterranean.

In accordance with the provisions of the Agreement, Turkey became a member of the Council as of April 6, 1954, date of receipt of the instrument of acceptance.



### Belgium

**CANNED FISH IMPORTS, 1953:** Belgium imported 13,494 metric tons of canned fishery products during 1953, mainly from Portugal, Canada, Japan, and the Netherlands, the U. S. Embassy at Brussels reported in a dispatch dated April 16. The only imports of fish from the United States consisted of 60 tons of cured fish. In 1952 the United States had supplied 1,086 metric tons of canned fishery products, 7 tons of fresh or frozen fish, 62 tons of cured fish, and 1 ton of shellfish.

According to Belgian import data, Portugal supplied 2,547 tons of canned sardines, substantially the entire quantity of sardines imported. Of canned pilchards, Japan supplied 1,747 tons; Netherlands, 37 tons; and the balance of 268 tons originated largely in the Union of South Africa. Canada supplied 3,849 tons of canned salmon, virtually the total quantity of those imports. Some 138 tons of canned salmon originated in "other" countries believed to consist almost entirely of canned salmon from the U. S. S. R. which supplied a total of 230 tons of fishery products to Belgium in 1953, all canned.

Belgian imports of canned fish in 1952 totaled 10,883 tons and in that year Portugal, Canada, and the United States were the principal suppliers. Imports of all fishery products in 1953 totaled 64,642 tons, compared with 60,927 tons in 1952. Imports in 1953 almost equaled the total volume of the Belgian fish catch.





## Canada

**SHRIMP GROUNDS LOCATED OFF BRITISH COLUMBIA:** Several promising shrimp grounds were located off British Columbia in a shrimp prospecting program carried out by the Canadian Fisheries Department's Pacific Biological Station between November 10, 1953, and March 10, 1954. One of these grounds, near Cape Lazo on the east coast of Vancouver Island, is being fished commercially at the present time. Two vessels carried out the program, the station's Investigator No. 1 and the chartered trawler Yuri M.

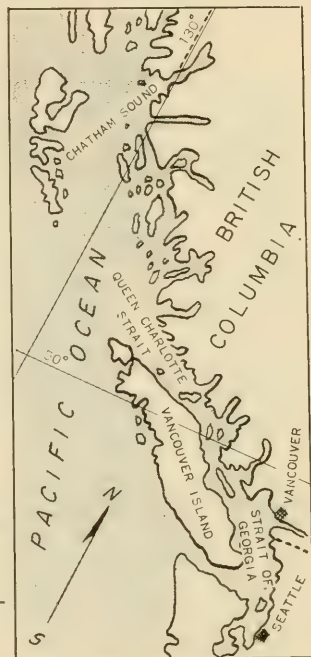
The primary objective of the program was to find new shrimp grounds. Localities were surveyed in the Strait of Georgia, Queen Charlotte Strait, and Chatham Sound. Also, a short experiment was conducted to compare the fishing abilities of the shrimp beam and otter trawls.

**SHRIMP HELD IN REFRIGERATED SEA WATER:** In conjunction with the shrimp exploratory program, facilities were provided aboard the Investigator No. 1 for experiments on the holding of freshly-caught shrimp in refrigerated sea water in place of ice to preserve their quality until landed.

Two loads of raw whole shrimp were brought from the fishing grounds to Vancouver by this means. The first, a load of 100 pounds caught on November 14, 1953, in Stuart Channel, was held for eight days at a temperature of  $30 \pm 10$  F. These shrimp were judged acceptable upon arrival. A portion of this catch was frozen green (heads off) in water for later observation by a commercial shrimp operator. They were judged acceptable after a week's storage. A load of 600 pounds of shrimp from Cape Lazo was brought to Vancouver after four days' storage. This load had been placed in the tank of sea water at a temperature of  $41^{\circ}$  F. and cooled to  $30 \pm 10$  F. Samples of this load were distributed to several commercial firms to put through their cooking and picking operation. The general opinion of the operators was that the shrimp were of good quality but were difficult to pick.

In an attempt to overcome this difficulty of picking, further holding tests have been made at the Station. Shrimp less than 24 hours old were obtained from commercial fishermen, and held at  $30^{\circ}$  F. for periods up to nine days in salt (sodium chloride) brines somewhat saltier than sea water. Preliminary results indicate that the chilled stronger brines containing up to six percent salt give a firmer, better-quality, more easily picked product than when the raw shrimp are held in chilled sea water at the same temperature for the same length of time.

The equipment used on board the vessel consisted of a cubical tank 42 x 42 x 42 inches outside measure, estimated to hold 1,500 pounds of fish, installed in the vessel's hold. Refrigeration was supplied by a  $\frac{1}{3}$ -horsepower Freon-12 air-cooled condensing unit powered by a  $\frac{1}{2}$ -horsepower, 32-volt direct-current motor. The motor was powered by the ship's starting batteries. These are charged primarily by the main engine generator. However, a 1-kilowatt, 32-volt, gasoline-powered auxiliary generator was provided for emergency use. Agitation was provided by a  $\frac{1}{55}$ -horsepower, 32-volt direct-current centrifugal pump delivering approximately 8 gallons



per minute. The cooling coil was a single circuit of 50 feet of  $\frac{5}{8}$ -inch copper tubing, externally nickel plated to resist sea-water corrosion. This coil was designed to provide hold-over refrigeration in the form of ice on the outside of the coil, sufficient to offset overnight heat leakage. The tank itself, made of 11-gauge steel plate, was coated internally with a non-contaminating anticorrosive paint and covered with 1-inch cork insulation. Care was taken to use equipment and materials suitable and economically feasible for application to commercial fishing boats.

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**FISHERY INSPECTION STANDARDS CONSIDERED:** Discussions aimed at standardizing the inspection of Canadian fish plants and fishery products were held recently in Ottawa by fishery inspection officers of the Federal Department of Fisheries and scientists of the Fisheries Research Board of Canada. The object of the discussions was to find some way of arriving at standards of inspection which could be applied all across Canada, according to the April Trade News of the Department of Fisheries.

The meeting followed an extensive coast-to-coast survey of more than 500 fresh, frozen, salted, and pickled fish plants which handle fish for interprovincial or international trade. An attempt is now being made to set uniform standards so that it will be possible to maintain peak quality from the time the fish are caught to the time they reach the consumer.

The Deputy Minister of Fisheries told the gathering that much new knowledge had been obtained with regard to the proper facilities necessary to maintain top-quality fishery products. He said it was now possible to think of reconstituting the Department's inspection service for control of storage of fish while at sea, during processing, and while in transit to the markets both in Canada and abroad.

Committees were set up to discuss plant construction and location, plant equipment, plant sanitation, and plant operation. Another committee was formed to discuss more adequate inspection of fresh and frozen fish.

Any proposed program for increased inspection and an outline of standards for proper plant facilities will be discussed with the industry, and all the provinces concerned will be consulted before any new measures are put into force.

\* \* \* \* \*

**FISHERIES MARKETING OPERATIONS:** An outline of Canadian fisheries marketing operations was presented by the Minister of Fisheries in the House of Commons on May 7 during a debate on the Department of Fisheries Budget.

The Minister was extremely optimistic and pointed out that the Government had been able to aid the Newfoundland cod industry by purchasing fish for Greece and Korea. He also stated that the industry by making use of new processes, particularly the preparation of fish sticks and block freezing of small pieces of fish, was expanding its markets both in Canada and the United States.

Speaking of the salmon industry of British Columbia, the Minister said that through its own efforts and those of the Minister of Finance in persuading Australia and New Zealand to remove their embargoes against Canadian salmon purchases, the backlog of this fish on the West Coast had been sold.

Looking to the future, he was encouraged by the decision of Brazil to purchase Newfoundland cod and he was optimistic about the present trade delegation now touring the Iberian Peninsula. This delegation is laying the groundwork for new trade agreements which the Government hopes will provide for increased purchases of cod by Portugal and Spain.

The Minister also discussed international agreements and commissions in the fishing industry. He maintained that these agreements were necessary for the future of the industry; and for the rehabilitation of certain sections of the industry, such as the salmon industry on the West Coast. He mentioned that there was a very real need for an agreement between Canada and the United States on the Great Lakes fisheries, and the pink salmon fisheries on the Pacific Coast. He also brought up the matter of the sealing agreement of the Pacific Ocean and expressed the hope that a reasonable solution could be reached in the near future, a May 11 U. S. Embassy dispatch from Ottawa states.

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**EXPORTS OF FISHERY PRODUCTS FOR 1953 AND OUTLOOK FOR 1954:** The total value of Canadian exports of fishery products in 1953 amounted to C\$114 million, 2.4 percent less than the 1952 total of C\$117 million, according to the February 20 *Foreign Trade*, a Canadian Government publication. But there were some significant trends in the 1953 foreign fish trade. Exports of fresh and frozen fillets to the United States increased; sales of canned salmon abroad, principally to the United States, Belgium, Italy, and the Netherlands, almost doubled; revenue from exports of shellfish continued high; Jamaica bought more salted cod; and the Dominican Republic's imports of salted pollock and smoked herring bloaters improved.

Canadian Fishery Products Exports, 1953 and 1952 <sup>1/</sup>				
Item	Quantity		Value	
	1953	1952	1953	1952
	1,000 lbs.		1,000 C\$	
Fresh and frozen whole or dressed:				
Total sea fish .....	125,898	142,177	16,584	17,479
Total fresh-water fish .....	54,259	55,971	13,248	14,475
Fresh and frozen fillets:				
Total sea-fish fillets .....	78,731	71,997	17,361	17,088
Total fresh-water fillets .....	11,128	9,072	4,029	3,812
Smoked fish .....	9,947	12,500	1,320	2,005
Salted fish .....	117,498	132,276	17,427	19,655
Pickled fish .....	35,415	39,606	3,491	3,878
Canned fish .....	58,499	47,415	16,202	11,554
Mollusks and crustaceans .....	30,337	30,754	17,587	17,510
Miscellaneous .....	-	-	7,060	9,719
Total exports .....	-	-	114,309	117,175
<sup>1/</sup> Preliminary.				

A resumé of 1953 production and foreign sales in the main groups of fisheries products, and a look at the prospects for 1954 follow.

**Fresh and Frozen Fish:** The outlook in 1954 for fresh and frozen fish appears quite bright, almost the reverse of the position early in 1953. Prices for fresh and frozen fish in the first part of 1953 were depressed, and stocks were at an all-time high in both Canada and the United States. Several reasons were given for this condition, such as large imports into the United States market from European sources, including Iceland and Norway, lower prices for meats generally, and the fact that chain stores were buying only their immediate requirements of fillets. However, the situation improved towards the end of the summer when it became known that United States and Canadian production of groundfish fillets was considerably lower and that United States imports from other sources were down.

Prices for fresh and frozen groundfish fillets are firmer and prospects for the coming season seem good.



A comparatively recent innovation in the frozen fish field is frozen breaded fillets and fish sticks. Sales of these products, with their convenience appeal--"just heat and serve"--are increasing, particularly in the United States market.

Pickled, Salted, and Dried Fish: Early forecasts in 1953 predicted fairly good markets for salted fish, especially since an analysis of world production of salted groundfish indicated that available supplies would be lower than in the previous year. But large consuming markets such as Brazil did not buy their usual quantities because of currency difficulties, and the surplus stocks were overhanging the other markets. However, substantial sales were made after Brazil revamped its exchange regulations in October, permitting importers to bid for available exchange at the daily auctions. In addition, some C\$950 thousand worth of salted cod is being procured from Canadian producers for relief shipments to Greece and Korea.

If sales continue at present levels, Canadian exporters of salted groundfish were expected to have little trouble marketing their current stocks during the balance of the 1953/54 season which ends on June 30, and in that event, were expected to find themselves in a firmer marketing position at the outset of the new season.

Stocks of pickled fish and bloaters are currently higher than last year, although a demand from the Caribbean area for good-quality fish at competitive prices is expected. Jamaica's imports of pickled herring were considerably larger than in 1952, and prospects for 1954 are encouraging.

Canned Fish: In the spring of 1953 Canadian west coast packers were faced with large surplus stocks of canned salmon. The prospects were poor but a contract with the United Kingdom for some 200 thousand cases and increased sales in Belgium and the United States and in the domestic market helped to relieve the situation.

The 1953 Canadian pack exceeded 1.8 million cases, compared with the 1.3 million cases put up in 1952, and difficulties were again anticipated. However, Belgium, Italy, and the Netherlands bought substantial quantities, and the poor runs of Alaska pink salmon and California pilchards strengthened the demand in the United States for the Canadian packs.

Production of canned sardines in 1953 in Canada was quite low and the current demand and price are exceptionally good. The British colonies in the Caribbean area are among the important outlets for this fish product.

The market for canned lobster continued strong in the United States. Shipments to the United Kingdom this year will be governed by the U.K. Token Shipment Plan, based on 30 percent of exports during the period 1936-38.

Byproducts: Herring meal is again being produced in quantity in British Columbia after a year's lapse, because of a strike by West Coast herring fishermen. The bulk of this commodity is sold in the United States market and prospects seem encouraging. Canadian Atlantic Coast fish meal is also marketed in both Canada and the United States; prices are a little lower than at this time last year.

Herring oil prices have strengthened a little but, as is the case with other fish oils, they are still below those of a few years ago.

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REVIEW OF NEW BRUNSWICK'S FISHERIES, 1953: Almost 11,200 persons are actively engaged in primary fishing operations in New Brunswick while another 3,800 are employed in fish-processing plants, a March 5 U. S. consular dispatch from St. John points out. Approximately C\$7,750,000 is invested in vessels, gear, and

shore facilities; a similar amount is invested in 60 processing plants centered in the three seaboard counties of the Province. Some United States capital is invested in the processing plants.

**Catch and Value:** During 1953 the landings of sea and inland fish in New Brunswick totaled 218,240,000 pounds, valued at approximately C\$7,515,000, as compared with 249,122,000 pounds, valued at C\$7,822,000, in 1952 (table 1). This significantly indicates that although production declined during 1953, the landed value increased even though groundfish export prices for the United States were much lower than previous years. Increased imports into the United States from other countries allegedly lowered the Canadian export prices.

Table 1 - New Brunswick Landings and Value of Sea and Inland Fish, 1940-1953

Year	Quantity	Value	
		Ex-vessel	Marketed
	1,000 lbs.	1,000 C\$	1,000 C\$
1953 <sup>1</sup>	218,240	7,515	2/
1952	249,122	7,822	19,700
1951	227,038	7,558	21,155
1950	239,671	6,792	18,053
1949	189,235	6,438	17,428
1948	227,336	7,885	20,122
1947	217,537	5,996	17,132
1946	222,077	7,146	16,420
1945	155,696	5,478	13,271
1944	175,172	5,404	11,969
1943	181,521	5,193	11,129
1942	162,339	3,650	7,133
1941	176,873	2,828	6,485
1940	144,568	2,029	4,966

<sup>1</sup>/Estimated.

<sup>2</sup>/Not available.

The year 1948 was the highest for landed value of fish in New Brunswick and 1952 was the highest for production. During the years 1940 through 1945 both the landings and landed value increased considerably while the marketed value fluctuated, but that after 1946 the market value steadily increased while the landed value leveled off. This would indicate that since World War II more attention has been given to the marketing of fish from this area and that the gross earnings of fishermen has remained rather constant.

Table 2 - New Brunswick's Fisheries Landings and Ex-vessel Values by Species, 1951-52

Species	1952		1951	
	Quantity	Value	Quantity	Value
	1,000 lbs.	1,000 C\$	1,000 lbs.	1,000 C\$
<b>SEA FISHERIES</b>				
Alewives .....	33,336	221.6	22,522	142.2
Clams .....	7,782	352.4	10,310	329.6
Cod .....	24,266	657.8	25,187	654.4
Haddock .....	2,519	144.1	2,332	133.3
Hake .....	3,803	68.0	2,509	46.6
Herring .....	84,043	756.5	62,466	594.2
Lobster .....	10,242	2,801.0	10,565	2,505.4
Mackerel .....	2,711	115.0	1,152	47.2
Oysters .....	4,314	282.1	4,558	268.3
Plaice .....	7,731	252.0	7,093	210.0
Pollock .....	3,552	57.1	2,464	46.9
Quahaugs (hard clams) .....	1,171	52.6	707	18.8
Sardines .....	52,887	843.0	62,503	1,308.2
Shad .....	1,719	66.1	1,791	66.9
Smelts .....	2,266	434.9	4,172	581.3
Miscellaneous .....	3,387	624.1	5,078	572.6
Total sea fish .....	245,729	7,728.3	225,409	7,525.9
<b>INLAND FISHERIES</b>				
Alewives .....	3,110	54.6	1,378	27.8
Pickrel .....	27	3.9	24	3.1
Salmon .....	29	14.4	38	17.9
Shad .....	179	12.7	169	10.7
Miscellaneous .....	53	7.7	20	2.9
Total Inland Fish .....	3,393	93.3	1,629	62.4
Grand Total .....	249,122	7,821.6	227,038	7,588.3

The latest breakdown available by species is for the year 1952 (table 2). Herring and alewives appear to be the species most responsible for the large increase in the 1952 catch while the sardine catch declined. As usual, lobsters continued to contribute most to the gross earnings of the fishermen. Groundfish ranked next in order of importance in gross earnings.

Sardine fishing seems to have the greatest year to year fluctuation in production, and this industry constantly pressures the Federal Government for subsidies. The Federal Government has assisted the sardine fishermen in minor emergencies in the past which in turn causes the lobster fishermen to pressure for subsidies. This was especially so during 1953 when frequent major storms destroyed many lobster traps in the New Brunswick fishing area. Even though figures are not available on sardines for 1953, trade sources stated that the year was one of the worst in a decade.

Table 3 - New Brunswick's Sardine Catch, 1946-52			
Year	Quantity	Value	
		Ex-vessel	Marketed
	1,000 lbs.	1,000 C\$	1,000 C\$
1952	52,887	843	1/
1951	53,824	1,304	5,604
1950	67,493	695	4,939
1949	58,590	1,172	4,379
1948	86,954	2,149	7,248
1947	101,218	1,537	6,615
1946	97,223	1,513	4,169

1/Not available.

**Marketing:** Prices for New Brunswick frozen groundfish fillets in the United States during 1953 were lower due to increased U. S. imports of fillets, mainly cod, from Denmark, Netherlands, West Germany, and the United Kingdom in addition to the usual supply from Iceland and Norway. The Fish Packer's Association of New Brunswick members are modernizing and expanding their plants in an effort to offset the new competition for the United States market. The processors are enthused over the recent Iceland-U. S. S. R. barter agreement whereby Russia will absorb large quantities of Icelandic fish. They feel that this agreement will eliminate a great quantity of Icelandic fish which they allege has been dumped on United States markets as a result of the British ban on Icelandic direct fresh fish landings by fishing vessels beginning late in 1952. Prior to 1952 Iceland traditionally marketed the bulk of its fish in the United Kingdom and the alleged dumping on the United States market seriously worried New Brunswick fish producers, according to reports.

**Government Aid:** The Provincial Fisheries Branch continued its program of promoting the increased use of groundfish draggers for use in the Gulf of St. Lawrence and the Bay of Fundy areas. Further, experiments were carried out on in-shore flounder dragging in an attempt to ease the economic situation of fishermen between the spring herring season and late summer lobster season on the northern shores of the Province. The Provincial Fishermen's Loan Board continued its program of granting large loans for the construction of draggers and during 1953 a total of seven 60-foot draggers were completed. The Provincial Loan Board granted loans totaling over C\$400,000 during 1953 and approximately C\$56,000 of this amount was subsidized by the Federal Government. The Provincial Government collected approximately C\$100,000 from fishermen on loans extended during 1953.



## Denmark

**MARINE-OIL IMPORTS AND EXPORTS, 1953:** Denmark's marine-oil imports in 1953 totaled 16,130 short tons, 70 percent less than 1952 imports, according to the U. S. Embassy at Copenhagen. Whale oil made up 72 percent of the 1953 total.

Marine-oil exports of 8,824 short tons were 137 percent greater than the year before. Herring oil accounted for 84 percent of the total.



Danish inventories of marine oils declined 34 percent during 1953, and at the end of the year stocks on hand totaled 4,230 short tons.



## Ecuador

**U. S. FIRM GRANTED TEN-YEAR FISHING RIGHTS:** A large United States west coast fishing firm has been granted fishing concessions in Ecuadorian territorial waters for a ten-year period, reports the U. S. Embassy (May 12) at Quito. The company promises to install a refrigeration unit and later a fish-preserving unit on the Ecuadorian coast. It is estimated that the firm will invest one million sucres (approximately US\$170,000) in Ecuador during the first two years of the contract.



## Finland

**FISHERY PRODUCTS CONSUMPTION, 1952/53:** The per-capita consumption of fishery products in Finland during 1952/53 (August-July) averaged 34.1 pounds (round weight for domestic catch and product weight for imports), according to a January 22 dispatch from the U. S. Legation at Helsinki. Production during this period totaled 57,600 metric tons (round weight) and gross imports amounted to 10,300 tons (product weight); stocks on hand at the beginning of the period (August 1, 1952) totaled 500 tons; a total available supply of 68,400 tons. Of this, 64,000 metric tons were used for food, 4,100 tons for animal feed, and 300 tons were on hand on August 1, 1953.



Fishermen lifting Baltic herring fyke net in the Turku (Finland) Archipelago area.

10,000 tons. Combined with the stocks at the beginning of the period this makes a total of 68,300 metric tons available--64,000 metric tons for food, and 4,300 tons for animal feed.



## France

**FISHERIES PROBLEMS:** The problems of the French fisheries were brought out at a Paris meeting on March 25 by the President of the Central Committee of Fisheries of France. The Committee is an advisory committee to the French Government in fishery matters. Following are some translated excerpts of the speech printed in the March 26 Le Marine, a French fishery paper.

"And now we come to the very important problem of imports. It seems that the Government wants to embark on a policy of more liberal imports of foreign products either by lessening the strict application of quotas or by making more funds available for international payments, or both. We are especially opposed to freeing the import of crustaceans, of oysters and other bivalves; also, of caviar and of fish eggs generally. Nothing should be done in this matter before the Sub-committee on Crustaceans is consulted.

"If we realistically look into the future, it is doubtful that we can assist in liberalizing international trade. We are especially opposed to making available funds for payments in foreign countries to purchase fishery products. We request, instead, that greater attention be given to certain weaknesses in our domestic fishing industry, which lacks modernization. We regret that only assistance is given to the construction of fishing vessels above 50 net tons and no subsidy payments are made for use of coal, used on fishing vessels. It is necessary to undertake economic studies on price differences of French sardines and the Portuguese sardines and on price differences of French sardines and Moroccan sardines. It seems that the Moroccan sardine industry is favored by longer seasons, more modern vessels, and lower wages. We request government assistance in the increase of consumption of fish. We also request the lowering of taxes on gasoline and Diesel oil for fishing vessels. The Committee also proposes for sardines and mackerel a minimum price.

"We are more hopeful, the President continued, for the development of the tuna industry because of higher prices for fresh tuna and canned tuna. But the best intentions remain on paper and cannot materialize if there is no spirit of unity among all parts of the fisheries. I appeal, therefore, to the unions, the boat owners, the processors, the wholesalers, and the retailers to unite in this hour in which we have to face very important problems."



## French Morocco

FISH MEAL AND OIL PRODUCTION, 1953: The rapid expansion of French Morocco's fish byproducts industry is illustrated by exports which, during 1953, consisted of 18,115 short tons of fish meal and 3,947 tons of fish body oil, as compared with but 14,814 tons of fish meal (including related products) in 1952, reports the U. S. Consulate General, Casablanca.

A considerable increase in the industrial fish catch occurred in 1953 in the face of curtailed canned fish output. The bulk of the 50,800 tons of fish delivered to the byproducts plants located at Agadir was devoted primarily to the production of fish meal and fish oil.

The fish-oil industry is attempting to introduce the use of its product in the mixture of edible oils utilized in the fish-canning process, the quantity of fish oil not to exceed 20 percent of the volume of the mixture. If successful, this development would assure the fish-oil industry of a significant home market. In France, however, the use of fish oils in canning processes is not legal.



## Greenland

**NEW CONSTRUCTION AT FARINGEHAVN FISHERIES HARBOR:** Extensive construction in the West Greenland fisheries harbor of Faringehavn was planned for this summer by the Danish-Norwegian-Faroese trading company. Faringehavn is the principal base for Danish, Norwegian, and Faroe Islands fishing vessels operating in waters off Greenland. The program comprises a modern refrigerating plant, a salt silo of 7,000 metric tons capacity, and dwelling huts.

It was hoped that the proposed work could be completed before the end of August, an April 20 U. S. Embassy dispatch from Copenhagen states.



## Iceland

**OUTLOOK FOR FISHERIES:** Iceland's economic development during the first quarter of 1954 was generally favorable, an April 29 U. S. Legation dispatch from Reykjavik states. Preliminary indications are that the 1954 catch of groundfish may be somewhat larger than in immediately preceding years. Sales prospects are good, particularly for frozen fish fillets to the Soviet Union and the United States. Soviet purchases are fixed by the Soviet-Icelandic trade agreement. The new "fish stick" market in the United States may absorb half of Iceland's exports of frozen fish fillets to the United States. Salt fish prospects are fair and stockfish prospects are somewhat poorer.

Most of the increased catch during the first quarter of 1954 has been cod, which was utilized for frozen fillets. The production of frozen fish in January-February 1954 was considerably higher than in the corresponding period of 1953, reflecting the favorable outlook for this product. The United States market prospects for frozen fish are favorable and considerable amounts of 7-, 12-, and 19-pound packages are being prepared for institutions, as well as one-pound consumer packages. The new United States market for "fish sticks" is also encouraging to Iceland; approximately one-half of Iceland's 1954 exports to the United States of frozen cod have been for "fish sticks." The announcement that the 1954 United States quota for importation of fish fillets is almost unchanged from 1953 was welcomed by Iceland.

It appears that Iceland will be able to sell all of its 1953 production of stockfish despite overproduction. Iceland's production of stockfish last year is estimated at 12,000 metric tons (dried weight), of which 10,000 tons were salable and 8,000 tons were sold last year. The remainder is expected to be sold this year before the 1954 production comes on the market. It is estimated that the 1954 production of dried stockfish will be about half of last year's production. (The stockfish end product weighs only 15-20 percent of weight of the gutted fish with head delivered for drying. The head is removed before drying.) Stockfish prices last year reached a peak of 470 shillings per 100 kilos (29½ U. S. cents per pound) but most was sold at about 420 shillings per 100 kilos (26¼ U. S. cents per pound). At the end of March the price was about 390 shillings per 100 kilos (25 U. S. cents per pound). Producers believe that they can improve the quality of their stockfish this year by better bleeding and washing of fish to eliminate bloodstains and by better sorting and inspection.





## Japan

**MORE TUNA VESSELS FISH FOR AMERICAN SAMOA CANNERY:** Two more Japanese long-line vessels arrived in Pago Pago, American Samoa, in May and began delivering tuna to the cannery there. A third vessel was reportedly en route from Japan at the end of May, and a fourth was expected to follow. The vessels are fishing within 30 to 40 miles of the main Samoan Islands and are reporting catches of about 2 metric tons of albacore and yellowfin tuna per day on sets averaging about 1,400 hooks.

\* \* \* \* \*

**TUNA-TAGGING PROGRAM:** A tuna-tagging program has been announced by the Kanagawa Prefecture Fisheries Experiment Station at Misaki, Japan, according to the Japanese press (Nippon Suisan Shimbun, May 10). The program was apparently stimulated by the recovery by Japanese fishermen of two albacore tagged by the State of California. Although not specified, it appears that all species of tuna and spearfishes are to be tagged under this program.

The tag used will be a double vinyl-plastic tube with a nylon cord threaded through it. The outer tube will be clear and colorless, the inner tube will be opaque and red. On the inner tube the following legend will be lettered in English: RETURN KANAGAWA FISHERY EX. ST. MISAKI KANAGAWA JAPAN, followed by a similar message in Japanese and a serial number of the type, A0001.

The tag will be tied tightly around the caudal peduncle of the fish. It is planned to have the tagging done by commercial fishing vessels at the rate of one fish per voyage, which is expected to produce about 1,000 taggings per year.

\* \* \* \* \*

**TUNA MOTHERSHIP RETURNS FROM INDIAN OCEAN:** The Japanese tuna mothership Tenyo Maru departed from the Indian Ocean fishing grounds on May 19 with more than 2,700 metric tons of fish. The mothership's 30 catcher boats then began operating on their own and were expected to return to Japan singly in the near future. The mothership with its fish carriers arrived at Tokyo on June 2. As the fleet fished in the Indian Ocean, there was no damage from the Bikini hydrogen bomb explosion, reports the Japanese press (Nippon Suisan Shimbun, June 7).

\* \* \* \* \*

**RESEARCH EXPEDITION TO INVESTIGATE BOTTOM FISH IN EASTERN BERING SEA:** A Japanese research expedition is scheduled to investigate bottom fish (excluding halibut) in the Eastern Bering Sea, according to a May 11 U. S. Embassy dispatch from Tokyo. The expedition will consist of the Fishery Agency research vessel Toko Maru of 1,098 tons and 2 catcher boats of 60 tons each. The vessels were scheduled to operate in the designated area sometime in June.

\* \* \* \* \*

**SARDINE CANNING REGULATIONS:** Japanese Government regulations for the packing and marking of canned sardines are included in Law No. 153 (Export Commodities Law) and Law No. 233 (Foodstuff Sanitation Law) with amendments, reports a June 3 U. S. Embassy dispatch from Tokyo. These regulations came into force on February 19, 1954. The principal requirements for packing canned sardines are:

Minimum Standards (Export Standard):

1. Vacuum Condition. Can to be airtight; hermetically sealed at the joint as well as at the part to be rolled off; to stand tapping test, and be of good appearance.

2. Quality. Marine products, boiled: preservation, freshness, quality, color, luster, smell, and taste in good condition. Seasoning liquid in good condition. Marine products, in brine: no mixture of impurities. Marine products, in oil: edible vegetable oil of superior quality shall be used. Preservation, freshness, quality, color, luster, smell, and taste in good condition. Oil to be clear and of good color, smell, and taste. No mixture of impurities. Oil used in neither excessive nor insufficient quantity. Moisture content to be a minimum. Marine products, seasoned (including with tomato and pepper): preservation, freshness, quality, color, smell, and taste in good condition. No mixture of impurities. Seasoning liquid to be of proper thickness, color, luster, smell, and taste, and neither excessive nor insufficient in quantity.

3. Contents. (Note: Regulations for only sardines follow. "Net weight" means weight of sardines. "Content" means weight of sardines plus oil, brine, or seasoning liquid, as the case may be. Both are expressed in grams.)

Type of Pack	Type of Can	Net Weight of Sardines Grams	Contents of Can Grams
Boiled Sardines	No. 4, tall	350	425
	No. 1, oval	350	425
	No. 3, oval	165	215
	No. 1, small	125	155
Sardines in oil	No. 3B, sq.	90	105
	No. 5A, sq.	95	110
	No. 1, oval	350	400
	No. 3, oval	170	200
Sardines, seasoned	No. 4, tall	350	450
	No. 6, tall	175	210
	No. 1, oval	350	425
	No. 3, oval	165	200
	No. 3D sq.	280	340
	No. 3B sq.	80	100
Sardines, baked	No. 3, oval	160	170
	No. 3E sq.	115	120
Sardines, smoked in oil	No. 3B sq.	85	105
	No. 5A sq.	95	110
	No. 5C sq.	55	70
Sardines, with tomato and pepper	No. 4, tall	350	425
	No. 1, oval	350	425
	No. 3, oval	165	215
	No. 1, small	125	155
	No. 3B sq.	90	105
	No. 5A sq.	95	110
Sardines, halves, with tomato or pepper	No. 1, oval	350	425
	No. 3, oval	170	215
	No. 1, small	125	155
	No. 3B sq.	90	105
	No. 5A sq.	95	110

Grades are classified as follows:

Quality A - Fancy  
Quality B - Standard

Units shall be of similar size. Code letter for the number of fish in each can must be embossed on the top of the can as follows (except for sardines seasoned or baked or for halves):

Type of Can	Code letters			
	G	L	M	S
	..... (number of fish in can) .....			
No. 4, tall	-	max. 12	13-20	min. 21
No. 1, oval	max. 8	9-12	13-20	min. 21
No. 3, oval	max. 8	9-12	min. 13	-
No. 1, small	-	max. 6	min. 7	-
No. 3B, sq.	-	6-8	9-12	min. 13
No. 5A, sq.	-	3-5	6-8	min. 9

Name of contents should appear clearly on the label. Cans to be painted or embossed with name of contents, date of canning, and name of cannery. (Note: These are all in code.)

Packing Requirements, Cartons:

1. Materials to be used must be of a pressure resistance of not less than 275 pounds/sq. in. by the Muller Tester. Maximum content gross weight should be 55 pounds. When the gross weight of content is less than 20 pounds, material used shall be not less than 200 pounds/sq. in. by tester.

2. Flat iron wire of not less than two-mm. width must be used to staple seams of boxes, at intervals of not more than 1.5 inches; alternatively cloth tape not less than 2 inches in width may be used.

3. Upper and lower flaps at the top of a box must be sealed with sodium water glass or other material not less effective. Joints of flaps must be sealed with paper tape of not less than 2 inches in width.

4. The bottom of the case must be sealed the same as the top or, alternatively, the flap stapled with flat iron wire of not less than 2 mm. width, in not less than 16 places. In case the gross weight of the contents is less than 25 pounds and bottom area of case is less than 150 sq. in., 12 staples will be sufficient.

Mode of Indication:

1. Words of indication to show that the commodity is up to the minimum standard shall be given as "Export Standard." Words of indication to show that the packing is up to the export packing standards shall be given as "Export Packing."

2. The height of letters shall be 3mm. or higher, but in the case of letters on the outside packing the height must be 10 mm. or higher.

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ANTARCTIC WHALE-OIL PRODUCTION, 1953/54: Japanese production of whale oil during the 1953/54 Antarctic season was estimated at about 41,400 short tons, a record postwar output, according to the May 10 Foreign Crops and Markets of the U. S. Department of Agriculture. The two participating expeditions reported an aggregate kill of 1,884.7 blue-whale units as compared with 1,527.9 units and 37,500 tons of whale oil in the preceding season.

Of the total 1953/54 Japanese Antarctic output, about 26,660 tons will be sold abroad. The United Kingdom will buy 6,160 tons at £81 per long ton (US\$202.50 per short ton) and the remaining 20,500 tons will go to Germany for £81-10-0 per long ton (US\$203.75 per short ton).

JAPANESE GOVERNMENT



## Mexico

SPINY LOBSTERS MAY BE SOLD DURING CLOSED SEASON: The Mexican closed spiny lobster fishing season applies only to the catching of lobsters and not to the sale of lobsters, the Ministry of Marine recently advised the U. S. Embassy at Mexico City. The most recent closed-season modification, published in the March 18 Diario Oficial, changed the fishing season in the Gulf of California between parallels 29 and 23 to April 16-October 31.



## Netherlands

FISHING FLEET MODERNIZATION PLANNED: A ten-year plan to modernize the Netherlands fishing fleet has been drafted, requiring a maximum investment of fl. 43.9 million (US\$11.6 million), according to the International Financial News Survey, April 30, 1954. The Reconstruction Bank will provide loans up to fl. 23.3 million, 75 percent of which will be guaranteed by the Netherlands Government. The fishing industry itself will have to raise capital of fl. 9.6 million (US\$2.6 million), and the remaining fl. 11 million (U.S. \$2.9 million) will have to be obtained from mortgage credits.

The purpose of the plan is to replace obsolete ships and not to increase the catch. No bonus will be given for the scrapping of old ships since this would be equivalent to a subsidization policy.

The Government has also promised a guarantee of fl. 2.5 million (U.S. \$0.7 million) to improve the fish-canning industry.



## Poland

NEW LIVER-OIL PLANT AND FISH CANNERY: A new large liver-oil plant will begin production in Gdynia, Poland, according to the May 27 issue of Fiskets Gang, a Norwegian trade paper. The plant will be able to produce 1,200 metric tons of medicinal and industrial liver oil annually. Domestically-produced cod livers will be used as raw material. After the plant goes into operation Poland will become independent of imports of industrial liver oil.



Construction of a fish cannery is in progress in Gizyce. When completed it will have a capacity of 2,300 metric tons of canned fish annually.

No date was given as to when the plants expect to begin operations.



### Portugal

**MARINE-OIL INDUSTRY, 1953:** Production: Production of marine oil in 1953 totaled 6,450 short tons, a decrease of about 13 percent from 1952, reports the United States Embassy at Lisbon. The 1953 output included 2,970 tons of sperm oil (production of Madeira and Azore Islands), 2,425 tons of cod-liver oil, and 1,060 tons of fish oils (mainly sardine).

**Exports:** Portuguese exports of marine oils in 1953 totaled 9,960 short tons, an increase of about 86 percent from 1953 shipments of 5,409 tons. More than half of the 1953 exports were sperm whale oil--5,314 tons; the remainder was cod-liver oil--2,801 tons; and fish oil--1,845 tons.



### South-West Africa

**FISHERIES TRENDS: Pilchard:** Exploitation of the pilchard resources found in the Walvis Bay area continues to increase, according to an April 26 U. S. consular dispatch from Capetown. There are now 6 reduction and canning factories at Walvis Bay as compared with 12 on the west coast of the Cape Province in the Union of South Africa. The total catch of pilchards in the Walvis Bay area during 1952 was 243,000 metric tons. The catch during 1953 was set at 250,000 tons and the total figure has been divided among the six factories on the basis of their individual capacity. Four of the plants can take a maximum of 46,875 tons while the remaining two are limited to 31,250 tons each.

Conservation of these pilchard resources is very much evident in recent steps taken by the Government with approbation of the commercial fishing companies. The total catch has been limited to 250,000 metric tons per year, and no additional licenses will be granted in the foreseeable future for the erection of additional reduction plants and canneries over and above the six now in existence.

**Spiny Lobsters:** The oldest section of the South-West African fishing industry, the crayfish or spiny lobster industry, is located in the Luderitz area. This fishing is very strictly controlled by the South-West African Administration in much the same manner as the Union spiny lobster industry. Control is exercised by limiting the quantity of canned spiny lobster and frozen spiny lobster tails that may be exported each year. The export quota is divided among the established plants, and these quotas are quite effective in limiting the total catch since the local market is quite small and not subject to fluctuation. In addition there are restricted fishing areas and also size limitations. Removing lobsters in berry is also prohibited.

The United States is the destination of practically all of the frozen spiny lobster tails exported from South-West Africa, as well as a good portion of the canned spiny lobster. The spiny lobster processing companies located at Luderitz operate in conjunction with Union companies who are also subject to governmental control. The South-West African companies are under the control of the South-West Africa Administration while the Union companies are under supervision of the Union Director of Fisheries.

There are six spiny lobster processing plants in the Luderitz area, with a total export quota of 3,999,984 pounds--of which 40 percent may be exported in the form of frozen spiny lobster tails. Thus at least 60 percent of the total exported production must be canned.



## Spanish Morocco

**FISHERY TRENDS, 1953:** The total catch of fish in Spanish Morocco (plus Centa and Melilla) during 1953 amounted to 19,967 metric tons as compared with the 1952 catch of 20,245 tons and 20,253 tons in 1951.

Canned fish is an important export item for Spanish Morocco, according to a U. S. Legation dispatch (May 28) from Tangier. Prices for canned tuna and sardines were down in 1953 and agents were seeking new markets abroad. A new fish cannery was constructed at Castillejos, but like the other canneries it suffered from a shortage of tin plate.

The main fishing ports were Larache, Villa Nader, Rio Martin, Villa Sanjuro, Rincon Medik, Cabo de Agua, and Ifni (a small colonial enclave on the southwest coast of Morocco).



## Tunisia

**SPONGE PRODUCTION, 1953:** Tunisian sponge production in 1953 amounted to 130.8 metric tons or 13 percent more than the 115.2 metric tons produced the previous year. It is possible that the increased production was due to the currently growing efforts by the Tunisian Government to find and exploit export markets for all domestically-produced commodities including sponges. During 1953 the United States imported only 2 metric tons of Tunisian sponges as compared to 3 metric tons in 1952.

Production during the first two months of 1954 greatly exceeded the monthly average for 1953, according to a consular dispatch (May 14) from Tunis.



## Union of South Africa and South-West Africa

**FISH MEAL AND OIL PRODUCTION, 1953:** Production of fish oil in the Union of South Africa and South-West Africa in 1953 reached a new high of 24,480 short tons, an increase of 16 percent from the previous record output of 21,000 tons in 1952. Production of fish oil at Walvis Bay, South-West Africa, increased substantially from 7,780 tons in 1952 to 11,250 tons, but Union output decreased slightly from 13,250 tons to 13,230 tons. While new high levels were reached due to the expansion at Walvis Bay, the very high rate of development which had been maintained over the past 6 years by the fishing industry showed signs of slackening.

Exports of fish oils in 1953 totaled 18,186 tons, mainly to the Netherlands, the United Kingdom, Germany, and Norway. The quantity exported last year was 2.5 times more than in 1952, according to the May 24 Foreign Crops and Markets, a U. S. Department of Agriculture publication.

Fish-meal production in 1953 was 118,600 tons against 87,800 tons in the previous year. While export data for fish meal were not given for 1953, in 1952 exports of meal were 56,027 tons, 60 percent of which went to the United States.



## Union of South Africa

**OYSTER CULTURE EXPERIMENTS SUCCESSFUL:** South African experiments in oyster culture in the Knysna Lagoon, Cape Province, have proved successful, especially with an imported Portuguese oyster. This oyster grows to maturity in 18 months, a more rapid rate than in European waters. Testing of domestic strains has not been concluded but one species with a particularly good flavor offers excellent possibilities, according to the June 12 Foreign Trade, a Canadian Government publication.



## United Kingdom

**FISH INDUSTRY RECORD-KEEPING REGULATIONS PROPOSED:** Regulations to require the British white fish industry to keep certain records have been proposed by the White Fish Authority. The regulations are due to go into effect soon, according to the May 1954 Fish Industry, a British fishery magazine.

Those engaged in the white fish industry will be required to keep:

(a) A record of all receipts and expenditures in respect of business in the white fish industry, showing the transactions to which they relate; (b) invoices, receipts or other documents concerning these transactions, or copies of them; (c) records of any banking account, or a certified extract of any banking transaction, in respect of business in the white fish industry.

Owners of fishing vessels are required to keep certain additional records, namely:

(a) Fish salesman's accounts; (b) a record of the weight of fish landed from every voyage by every vessel; (c) a register of the date and time of departure and arrival, and a record of the sums receivable or chargeable, for every voyage of a vessel of over 70 feet in length; (d) copies of the accounts already required by legislation to be rendered by owners of fishing vessels.

\* \* \* \* \*

**FISH CONSUMPTION, 1952/53--CORRECTION:** The United Kingdom per-capita fish and fillet consumption for 1952/53 as shown in the May 1954 Commercial Fisheries Review, p. 66, was incorrect as the amounts shown had not been converted from kilograms to pounds. The correct consumption data, in pounds, is as follows:

The United Kingdom per-capita fish and fillet consumption in 1952/53 (July-June) amounted to 22.9 pounds edible weight, according to a February 25 report from the U. S. Embassy at London. This was a decrease of 11 percent from the prewar (1934-38) average of 25.7 pounds. The consumption for the next fiscal year, 1953/54, is forecast to drop to 22.0 pounds per person.



The per-capita consumption of whale meat in the United Kingdom during 1952/53 was 0.2 pound and the forecast for the next year is estimated at 0.1 pound.

\* \* \* \* \*

**FATS AND OILS DECONTROLLED:** Fats and oils were decontrolled in the United Kingdom on May 8, 1954, after 14 years of government regulation, and trade in these items reverted to private operations in June, according to the U. S. Embassy in London. This represents another step in the gradual decontrol of the British economy which will ultimately shift the bulk of government buying to private enterprises. The Ministry of Food has also announced that it will decontrol canned salmon later in 1954.

Britain has traditionally imported fats and oils from nondollar sources. The postwar pattern of trade is dislocated to a large extent and many changes may occur. If fats and oils are freed of import controls, the factor determining Britain's sources for these items would be their competitive position. However, existing contracts to which the Ministry is committed may preclude any large switch in suppliers for the next 18 months to 2 years. The United Kingdom has been buying important quantities of fish and whale oils from Japan and Norway.

Decontrol is expected to result in a drop in stocks held in the United Kingdom as private trade will not be able to finance large stocks. Although decontrol will have a downward impact on immediate report requirements, the continued import demand will depend also on the level of consumption. The fats and oils trade is expected to be subject to continued import licensing with restriction of imports from dollar areas, probably controlled under open individual license, which means freedom to import from dollar areas subject to individual importer licensing and recording of sales against an unannounced global quota.

The possibility of further return to a system of multilateral trade is dependent on general financial policy and on the convertibility of sterling. According to reports, the United Kingdom is trying to work toward a more liberal system of trade and has made some important steps in this direction. Although exports have increased over the prewar period and offset the adverse terms of trade during the postwar period to a large extent, net earning power of "invisibles" has diminished. Under these conditions, the extent to which imports and consumption can be allowed to expand is questionable.

At the same time, some groups are pressing for a continued system of protection and preferences for commonwealth production. Commonwealth producers have considerable advantage in some commodities because of Imperial preferences. In other commodities, they have advantage through exclusion of dollar imports on balance-of-payments grounds. The protection afforded by such restrictions has become an accustomed shelter in many cases. For example, with restrictions on the importation of canned fish from dollar sources, British canned fish production has grown from 13 million pounds in 1946 to 46 million pounds in 1952.

\* \* \* \* \*

**NORTHERN IRELAND CANS CRAB MEAT:** Crab meat has been canned in Northern Ireland for the first time by a Belfast firm, in an attempt to compete with Russian and Norwegian canned crab meat, according to the May 14 issue of The Fishing News, a British trade paper.

Fishermen have sacrificed price so the crab meat can be retailed as low or lower than the foreign-produced product.

## U. S. S. R.

**TRAWLERS FISH ON GRAND BANKS:** Soviet trawlers have been spotted on the Newfoundland Grand Banks for the first time, a report in the April 23 issue of The Fishing News indicates. Spanish trawler skippers said they saw two Russian trawlers--the Odessa and Sevastapol, both of 1,670 tons.



## International

## INTERNATIONAL PACIFIC HALIBUT COMMISSION

Areas 3A and 3B Closed July 12: The International Pacific Halibut Commission announced that Pacific halibut Areas 3A and 3B were closed to halibut fishing at 11:59 p.m. (P.S.T.) July 12, 1954. The Commission estimated by that date the quota of 28,000,000 pounds for Area 3A would have been attained, and Area 3B (former Area 4) which had no quota would also be closed. Pacific halibut fishing this year opened on May 16 while in 1953 the opening date was May 17.

Areas 3A and 3B this season were open to fishing for 58 days as compared with 52 days (shortest on record) for Areas 3A and 1A in 1953, 60 days in 1952, 56 days in 1951, 66 days in 1950, 73 days in 1949, and 72 days in 1948.

Areas 2 and 1B closed at 11:59 p.m. (P.S.T.), June 5, 1954. These areas were open to fishing this season for 21 days--the shortest season on record for these areas--compared with 24 days in 1953, 26 days in 1952, 28 days in 1951, 32 days in 1950, 34 days in 1949, and 32 days in 1948.

Area 1A, extending south of Hecate Head, Oregon, will remain open through September 9, 1954.

In addition to the season indicated, further fishing will be allowed as follows: Area 2 to be reopened on August 1 for a period of 8 days. Area 3A and 3B to reopen on August 1 for a period of 10 days. Area 3B to again be reopened on August 15 for a period of 25 days.

Regulations for the retention of incidentally-caught halibut during the 1954 season are similar as those issued in 1953.

Note: Also see Commercial Fisheries Review, July 1953, p. 60; June 1953, p. 35.

Correction: In April 1954 issue of Commercial Fisheries Review, p. 36, the last sentence under "5" should read: Area 1A to open May 16 and remain open until the final closure date of Area 3B; i.e. September 9.



Unloading halibut at Ketchikan, Alaska.





# FEDERAL ACTIONS



## Foreign Operations Administration

**FORMOSA AUTHORIZED TO BUY MARINE DIESEL ENGINES:** The Central Trust of China, Taipei, Taiwan, announced intended purchases of 60 marine Diesel engines and accessories and miscellaneous equipment needed in Formosa for the Taiwan fisheries. This procurement, with FOA financing, lists the United States and Possessions, the European (OEEC) Participating Countries, and Japan as the areas of source, according to recent bulletins from FOA. The engines are to be used on sampans.

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**INDIA AUTHORIZED TO BUY OUTBOARD MOTORS AND DIESEL ENGINES:** The Government of India has been authorized FOA financing for the purchase of 12 units of marine, gasoline-powered, two-cylinder, 10 hp. outboard motors for the expansion and modernization of India's marine fisheries. The engines will be used to power boats 20 feet in length, 4-foot beam, 1½-foot draft, according to a June 4 bulletin from FOA.

FOA has also authorized India to purchase a total of 110 marine Diesel engines, complete with all fittings and accessories, according to a July 15 FOA bulletin. These engines will be used on fishing craft of 25 to 40 feet in length.

\*\*\*\*\*

**INDONESIA AUTHORIZED TO BUY COMMODITIES FOR FISHERIES DEVELOPMENT:** Indonesia has been authorized by FOA to purchase commodities for fisheries development totaling \$60,000, according to a June 24 bulletin from that agency. Indonesia is authorized to make the purchases in the United States and Possessions, and European participating countries.

The commodities listed in the bulletin include: fish-meal bags, miscellaneous metal and nonmetal products, electrical apparatus, generators, engines, motors, turbines, construction equipment, and industrial machinery (including office machines, appliances, and parts).



## Department of the Interior

**FISH AND WILDLIFE SURVEY TEAM REPORTS:** Four major recommendations, directed to improving the organization and services performed by the Fish and Wildlife Service were made by a Survey Team which was appointed by Secretary of the Interior McKay on March 31.

The Survey Team, which recently completed its assignment after six weeks of intensive study and investigation was made up of: James R. Turnbull, Seattle, chairman; Ross L. Leffler, Pittsburgh, Pa.; and John D. Pennekamp, Miami, Fla. M. George Goodrick and John B. Bennett, career employees of the Department completed the team.

Prefacing the Team's report (released July 15) was recognition that the Director of the Service had plans available for reorganization, which at the request of Secretary McKay were held in abeyance until the current survey could be completed. The Survey Team voiced the hope that its report would assist the Director in his effort to affect a reorganization.

The recommendations follow:

1. The Fish and Wildlife Service be reorganized to conform with the organization recommended in the report.



2. All functions of the Service be regionalized except that of fundamental research as defined.

3. Research relating to Wildlife and research relating to Fisheries be more closely coordinated with the operating requirements of the Service.

4. The public relations and publications programs be revitalized to achieve better public understanding and cooperation for the objectives and programs of the Service.

The problems of the Service, the Team points out, stem from three primary sources, defined as (a) lack of cohesion and unified purpose; (b) more and more states are becoming self sufficient in fish and wildlife management and conservation; and (c) public relations and publications.

One of the major sources of impaired morale within the Service, the Team pointed out, would be eradicated by "getting the operating branches out of research and getting the Branch of Research into the research the Service needs."

The Team stated that it found in discussions with Service personnel and with state officials who deal with its representatives that "improved public relations" ranked high in the list of pressing needs of the Service.

Sixteen specific recommendations to improve the public information program of the Service were made.

\* \* \* \* \*

ALASKA SURVEY TEAM REPORT APPROVED: Acting Secretary of the Interior Tudor on July 23 approved a report of a survey team, which was appointed to study the Department's organization, procedures, and functions in Alaska. The purpose of the survey was to determine how the Department could improve administration in the territory and to make recommendations toward this goal. However, the scope of the survey did not include commercial fishing.

The survey team was made up of Roy B. Earling, mining consultant, Seattle,

Wash., chairman; Glenn Duncan, businessman, Haines, Oregon; Gilbert H. Jertberg, attorney, Fresno, Calif.; and Robert Coote, staff assistant, Technical Review Staff, Office of the Secretary.

Recognizing the extent and complexity of the Department's responsibilities in Alaska, the team considered three possible recommendations to achieve closer coordination of activities.

Consideration was given to the appointment of an assistant secretary for Alaska. It was decided that this was impracticable at this time.

The team recommended that the Alaska Field Committee be activated under the direction of a full-time executive secretary or coordinator.

It was also recommended that the Department consider the establishment of a central administrative service organization, and a consolidated legal staff in the territory under the supervision of the Solicitor.

## FISH AND WILDLIFE SERVICE

NOTICE OF INTENTION TO ADOPT AMENDMENTS TO ALASKA COMMERCIAL FISHERIES REGULATIONS: The Secretary of the Interior gave notice in the Federal Register of July 14 that he intends to adopt amended regulations permitting and governing the time, means, and methods for the taking of commercial fish in the waters of Alaska, and related matters.

The regulations are to be effective beginning about February 1, 1955, and to continue in effect thereafter until further notice.

Interested persons are hereby given an opportunity to participate in considering changes in the regulations by submitting their views, data, or arguments in writing to the Director of the Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C., on or before November 19, 1954, or by presenting their views at a series of open discussions to be held as follows:

Alaska: Dillingham - July 30  
 Sitka - September 1  
 Juneau - September 3  
 Wrangell - September 7  
 Ketchikan - September 9  
 Kodiak - September 20  
 Anchorage - September 23  
 Cordova - September 27  
 Seattle, Washington - October 20, 21,  
 and 22.



## State Department

### APPROPRIATIONS INCLUDE FUNDS FOR INTERNATIONAL FISHERIES COMMISSIONS:

Funds totaling \$310,000 for international fisheries commissions were included in State Department fiscal year 1954/55 appropriations approved in a conference report and adopted by both Houses of Congress on June 30 and cleared for the President. Earlier the House had voted \$295,000 and the Senate \$325,000. In 1953, \$295,010 was allotted for the Commissions. There were no special instructions contained in the conference report.

As tentatively allocated by the State Department, the funds will be apportioned as follows:

	1954/55	1953/54
Inter-American		
Tropical Tuna		
Commission . . . .	\$117,195	\$107,000
Northwest Atlantic		
Fisheries Com-		
mission . . . . .	4,885	4,690
International Pacific		
Halibut Commission	50,500	48,000
International Pacific		
Salmon Fisheries		
Commission (Sock-		
eye) . . . . .	137,000	135,000
International Whal-		
ing Commission ..	420	420
Total . . . . .	310,000	295,110



## White House

### PRESIDENT DOES NOT ACCEPT TARIFF COMMISSION RECOMMENDATIONS ON GROUND FISH FILLETS:

The President on July 2 declined to accept the recommendations of the United States Tariff Commission for an increase in the duty on imported groundfish fillets and for a quota on imports in any one year.

The Tariff Commission had made an investigation of the effect of a trade agreement concession on the domestic groundfish fillets industry, under Section 7 of the Trade Agreements Extension Act of 1951.

The President, in identical letters to Senator Eugene D. Millikin, Chairman of the Senate Finance Committee and Representative Daniel A. Reed, Chairman of the House Ways and Means Committee, outlined certain of the problems confronting the domestic industry in recent years apart from the threat of imports from abroad. The President then pointed out that the recent introduction of a new product, fish sticks, demand for which has increased markedly even since the Tariff Commission prepared its report, leads him to believe that consumption of groundfish fillets promises to increase substantially within the next few years.

The President stated his conviction that "it would be a disservice to the long-run interests of the entire groundfish industry to limit the imports of groundfish fillets in these circumstances.

"It would," the President said, "hamper and limit the development of the market for the product and jeopardize present prospects for the increase in per capita consumption of fish, which is the key to a real solution of the industry's problem."

The text of the President's letters to the Chairman of the Senate Finance Committee and the Chairman of the House Ways and Means Committee follows:

Dear Mr. Chairman:

On May 7, 1954, the United States Tariff Commission, pursuant to an investigation under Section 7 of the Trade Agreements Extension Act of 1951, recommended restrictive action with regard to imports of frozen groundfish fillets, that is fillets of cod, haddock, pollock, cusk and rosefish.

The action recommended by three of the six commissioners was that the tariff on a certain part of our imports of groundfish fillets should be raised from 1-7/8 cents per pound to 2-1/2 cents per pound and further that the imports in any one year should be limited to a quota of 37 percent of the average annual consumption of groundfish fillets during the immediately preceding five years. The two commissioners recommended against this action. One commissioner did not participate in the decision because of a death in his family.

The basic issue that the commissioners had to determine was whether serious injury is being threatened or caused by increased imports at a rate of duty reflecting a concession made in a trade agreement with a foreign country. The concession in question was made originally to Canada in the Trade Agreement of 1938 and renewed in 1947 in the General Agreement on Tariffs and Trade. The concession consists of an undertaking by our government not to charge a rate of duty higher than 1-7/8 cents per pound on the first 15 million pounds of groundfish fillets imported in any year. A rate of 2-1/2 cents applies under the concession to imports in excess of this figure. The concession also provides that, whenever the average consumption in the United States during the immediately preceding three years exceeds 100 million pounds, the lower duty would apply to 15 percent of this average consumption figure. On the basis of 1953 imports, the recommended action would raise the duty on 34 million pounds of fillets and reduce the total quantity of imports by 13 million pounds.

The fishing industry of New England, which produces most of the domestic groundfish fillets, has not had an easy time over the years. It has been plagued with a number of difficult problems which have been the subject of extensive study. Groundfish of certain species have become scarcer on the nearby banks. This has meant longer voyages, higher costs and a need to fish more intensively. There have been labor-management difficulties and competition from imports have been stiff in the face of a market which has not been growing adequately.

The great unsolved problem of this industry has been how to expand its markets. Per capita consumption of fish in the United States, particularly in the Middle West, has remained relatively low. To increase consumption, the industry has sought ways to put fresh or frozen fish more frequently into everybody's diet. It has sought better packaging, better marketing, better advertising, and ways to make fish easier for the housewife to prepare. These efforts cannot, of course, succeed without at the same time keeping prices of fish in line with other products competing for the consumer's taste.

Recent developments have brought another great forward step in the introduction of a new product, fish sticks. Even at the time when the Tariff Commission prepared its report, there was some evidence that fish sticks might bring about a substantial increase in total groundfish consumption. Events have moved so rapidly since then that it now appears the industry's major problem is going to be to keep pace with demand, which this year is expected to be four or five times larger than it was last year. Fish fillets have always offered a relatively inexpensive source of protein. Fish sticks now appear to offer this advantage combined with ease of preparation. That being the case, it seems likely that fish sticks may finally bring about an increase in consumption of fish, which has held steady at between 10 and 12 pounds per capita annually for almost fifty years. Conceivably, consumption may increase by almost 50 percent within a few years as a result of the new product.

Thus it appears that the industry is on the way to solving an important part of its problem by tapping a new mass market. It seems particularly important not to interfere with that development but to give it fullest scope and encouragement. I have tried to measure the proposed import restriction in the light of this basic need. I am firmly convinced that it would be a disservice to the long-run interests of the entire groundfish industry to limit the imports of groundfish fillets in these circumstances. Such action would reduce the raw material supplies of the processors of fish sticks. It would create an artificial scarcity and tend to increase the price. At the same time it would hamper and limit the development of the market for the product and jeopardize present prospects for the increase in per capita consumption of fish which is the key to a real solution of the industry's problem. I have, therefore, after full consideration of the matter, decided against restrictive action.

The solution which appears to hold the best prospect for a vigorous, healthy domestic industry also best serves to strengthen the economics of several friendly nations. Although most of our groundfish fillets come from Canada, a substantial part come from Iceland, as well as such other countries as Norway, Denmark, the United Kingdom, West Germany and the Netherlands.

I am fully aware that the industry's problems have not all been solved. Further research in fishing technology, in conservation, and in knowledge of development and movement of the fish is needed. Fish processing, packaging and marketing and consumer education all present additional fields for further work.

The Federal Government has an important role to play in furthering these objectives. Accordingly, I have recently signed S. 2802, which sets aside certain revenues from fishing products for a special fund to be administered by the Secretary of the Interior, the purpose of which shall be to carry on such research and market development as I have just outlined. The Federal Government will also be alert to find additional ways in which appropriate assistance can be rendered. An additional restriction on imports, however, would not, in my opinion, help in the over-all task, but would hamper developments which now promise a brighter future, both for the industry and for the consumer.

Sincerely,

/s/ Dwight D. Eisenhower



## Eighty-Third Congress (Second Session)

JULY 1954

Listed below are public bills and resolutions introduced and referred to committees or passed by the Eighty-Third Congress (Second Session) and signed by the President that directly or indirectly affect the fisheries and allied industries. Public bills and resolutions are shown in



this section only when introduced and, if passed, when signed by the President; but also shown are the more pertinent reports, hearings, or chamber actions on some of the bills shown in this section from month to month.

**DISTRIBUTION OF FISHERY PRODUCTS:** The President on July 1 signed S. 2802, to encourage further the distribution of fishery products in the development of research programs and increased markets. (P. L. 466). The Law reads:

Public Law 466 - 83d Congress  
Chapter 447 - 2d Session  
S. 2802

#### AN ACT

To further encourage the distribution of fishery products, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the Act of August 11, 1939 (53 Stat. 1411), is hereby amended to read as follows:

"Sec. 2. (a) The Secretary of Agriculture shall transfer to the Secretary of the Interior each fiscal year, beginning with the fiscal year commencing July 1, 1954, and ending on June 30, 1957, from moneys made available to carry out the provisions of section 32 of such Act of August 24, 1935, an amount equal to 30 per centum of the gross receipts from duties collected under the customs laws on fishery products (including fish, shellfish, mollusks, crustaceans, aquatic plants and animals, and any products thereof, including processed and manufactured products), which shall be maintained in a separate fund and used by the Secretary of the Interior (1) to promote the free flow of domestically produced fishery products in commerce by conducting a fishery educational service and fishery technological, biological and related research programs, the moneys so transferred to be also available for the purchase or other acquisition, construction, equipment, operation, and maintenance of vessels or other facilities necessary for conducting research as provided for in this section, and (2) to develop and increase markets for fishery products of domestic origin and (3) to conduct any biological, technological, or other research pertaining to American fisheries."

"(b) For the purposes of this section, any agency of the United States, or any corporation wholly owned by the United States, is authorized to transfer, without reimbursement or transfer of funds, any vessels or equipment existing in its possession or control to the Secretary of the Interior for the activities, studies, and research authorized herein."

"(c) In carrying out the purposes and objectives of this section, the Secretary of the Interior is directed as far as practicable to co-operate with other appropriate agencies of the Federal Government, with State or local governmental agencies, private agencies, organizations, or individuals, having jurisdiction over or an interest in fish or fishery commodities and he is authorized to appoint an advisory committee of the American fisheries industry to advise him in the formulation of policy, rules and regulations pertaining to requests for assistance, and other matters."

"(d) The Secretary of the Interior is further authorized to retransfer any of the funds not to exceed \$5,000,000 to be made available under this section to the Secretary of Agriculture to be used for the purposes specified in section 1 of this Act, and only such funds as are so transferred shall be used for the purposes specified in section 1 of this Act with respect to domestically produced fishery products."

"(e) The separate fund created for the use of the Secretary of the Interior under section 2 (a) of this Act and the annual amounts thereto shall be available until expended, except (1) that not more than \$2,000,000 be spent in any fiscal year and (2) that the balance of the fund shall not exceed \$5,000,000 at the end of any fiscal year, and the Secretary of the Interior shall retransfer the funds in excess of said \$5,000,000 balance to the Secretary of Agriculture to be used for the purposes specified in section 32 of the Act of 1935 (49 Stat. 774; (U. S. C. 512c), as amended."

"(f) The Secretary of the Interior shall make a report to the appropriate committees of Congress annually on the use of the separate fund created under section 2 of this Act."

Approved July 1, 1954.

**Report on Hearings Before A Subcommittee On Merchant Marine and Fisheries, House of Representatives,** on various House Bills to further encourage the distribution of fishing products, and for other purposes. Hearings held April 2 and 3, 1954. The report includes statements by various members of Congress; Government and State officials; representatives of fisheries commissions, associations, and unions. Also included in the report are various reports and correspondence.

**DUTIES ON FISH STICKS:** H. R. 9824 (Bates), a bill to amend paragraph 717 of title I of the Tariff Act of 1930, with

respect to duties applicable in the case of fish sticks; introduced on July 7; to the Committee on Ways and Means.

The Committee on July 12 passed over H. R. 9824.

H. R. 9942 (O'Neill), similar to H. R. 9824; introduced on July 19; to the Committee on Ways and Means. S. 3727 (Sakontal), similar to H. R. 9824; introduced on July 9; to the Committee on Finance.

**DUTY ON FISH STICKS:** H. R. 9998 (Bates), a bill to amend the Tariff Act of 1930 with respect to the duties applicable to certain prepared fish (fish sticks and similar products); introduced on July 22; to the Committee on Ways and Means.

The bill provides that paragraph 720 of title I of the Tariff Act of 1930 is amended by adding at the end thereof the following subparagraph:

"(d) Fish sticks and similar products of any size or shape, fillets, or other portions of fish, if breaded, coated with batter, or similarly prepared, but not packed in oil or in oil and other substances, whether in bulk or in containers of any size or kind, and whether or not described or provided for elsewhere in this Act, if uncooked, 20 per centum ad valorem; cooked in any degree, 30 per centum ad valorem."

Sec. 2. The foregoing amendment shall enter into effect as soon as practicable on a date to be specified by the President in a notice to the Secretary of the Treasury following such negotiations as may be necessary to effect a modification or a termination of the international obligations of the United States with which the amendment would be in conflict.

**EMPLOYMENT PREFERENCE FOR ALASKANS IN BRISTOL BAY FISHERY:** H. R. 9884 (Miller of Nebraska), a bill to establish an employment preference for residents of Alaska in connection with fishing activities in the Bristol Bay area; introduced on July 13; to the Committee on Interior and Insular Affairs. The bill provides that in all fishing activities, including processing, carried on in the Bristol Bay area of Alaska, employment preference shall be given to residents of Alaska. For the purposes of this Act, the term "resident" shall mean only such persons as are citizens of the United States and who have resided in Alaska continuously for a period of at least two years. The Secretary of the Interior is hereby authorized to issue such rules and regulations as may be necessary for the implementation of this Act.

**INTERIOR DEPARTMENT APPROPRIATIONS:** Both the House and Senate on June 28 adopted conference report on H. R. 8680, Interior Department appropriations (including Fish and Wildlife Service) for the fiscal year 1955, clearing bill for White House (H. Rept. 1926).

H. R. 8680 signed by the President on July 1 (P. L. 465). The law provides funds to the Fish and Wildlife for the Investigation of Resources (Including the Branches of Commercial Fisheries, Fishery Biology, and Wildlife Research) as follows:

For expenses necessary for scientific and economic studies and investigations respecting conservation, management, protection, and utilization of fish and wildlife resources, including related aquatic plants and products; collection, compilation, and publication of information concerning such studies and investigations; and the performance of other functions related thereto; as authorized by law; \$4,127,000, of which not to exceed \$350,000 shall be available for the lamprey eel program.

**NORTH PACIFIC INTERNATIONAL FISHERIES CONVENTION:** H. R. 9786 (Tollefson)--a bill to give effect to the International Convention for the High Seas Fisheries of the North Pacific Ocean, signed at Tokyo, May 9, 1952, and for other purposes; introduced on July 2; to the Committee on Merchant Marine and Fisheries.

Also H. R. 9787 (Allen of California), similar to H. R. 9786.

S. 3713, (Bricker, Cordon, Knowland, Kuchel), similar to H. R. 9786, introduced in the Senate on July 7; to the Committee on Interstate and Foreign Commerce.

The House Committee on July 13 ordered reported to the House, H. R. 9786, amended.

The House on July 24 adopted committee amendments and passed, by a voice vote, H. R. 9786.

The Senate Committee on July 14 ordered favorably reported to the Senate, S. 3713, amended, (S. Rept. 1806). The fourth amendment to the bill inserts the words "as long as Alaska shall remain a Territory." The purpose of this amendment is to negate any congressional intent through the passage of this bill that the Northwest Atlantic Fisheries Act of 1950 should govern the relative areas of control over fisheries between the Federal Government and Alaska as a sovereign State when Alaska obtains its statehood. Obviously, this is a legislative determination which will have to be made through the basic act creating the status of statehood for Alaska. There are four other amendments to correct errors and clarify statements.

The Senate passed S. 3713, on call of calendar, on July 17.

**PROTECTION OF U. S. FISHERMEN ON HIGH SEAS:** The House Committee on Merchant Marine and Fisheries on July 20 ordered reported to the House, H. R. 9584, amended, protecting the rights of U. S. fishermen and others on the high seas and in territorial waters of foreign countries.

The House on July 24 passed H. R. 9584, after adopting committee amendments.

**PROTECTION OF U. S. VESSELS ON HIGH SEAS:** H. R. 9716 (King of California), a bill to protect the rights of vessels of the United States on the high seas and in territorial waters of foreign countries; introduced on June 28; to the Committee on Merchant Marine and Fisheries.

**RETURN OF FISHING VESSELS:** The Senate Committee on Interstate and Foreign Commerce on June 28 reported S. J. Res. 67, joint resolution to repeal certain World War II laws relating to return of fishing vessels, and for other purposes (Rept. No. 1649). The report states:

The considerations which brought about the enactment of these laws are no longer of any material significance. The

essential purpose of the act of April 29, 1943, was to authorize the return to their owners of fishing vessels and similar craft, primarily for the purpose of maintaining the fisheries and related industries in full production in order to bolster a lagging supply of food. There is no longer a need for this legislation since fishing vessels of the sort envisioned are now in ample supply. The purpose of the act of August 10, 1946, was to accord veterans a preference on purchasing unreturned vessels. Here, too, there is no longer any need for such legislation.

The Senate on July 6 passed without amendment S. J. Res. 67.

The House Committee on Merchant Marine and Fisheries on July 27 reported S. J. Res. 67, to repeal certain World War II laws relating to return of fishing vessels (H. Rept. 2550).

**TRADE AGREEMENTS EXTENSION:** The Senate on June 29 concurred in House amendment to H. R. 9474, to extend to June 12, 1955, authority of the President to enter into reciprocal trade agreements, clearing the bill for the White House.

On June 24 the Senate passed H. R. 9474, after adopting 1 amendment and rejecting 3 amendments, as follows: Adopted: Amendment by Senator Johnson of Colorado (for Senator Symington), barring decrease in duty on any article, the domestic production of which would be threatened by such decrease; and Rejected: Gore amendment (in the nature of a substitute for the bill and which would have extended present law for 3 years rather than); Mundt amendment, providing that if investigation by Tariff Commission indicates that importation of any articles will materially interfere with farm parity price program, President shall impose up to 50-percent fees on such articles; and Malone amendment to establish a Strategic and Critical Minerals and Material Authority.

H. R. 9474 was signed by the President July 1 (P. L. 464).

Public Law 464 - 83d Congress  
Chapter 445 - 2d Session  
H. R. 9474

AN ACT

411 68 Stat. 360.

To extend the authority of the President to enter into trade agreements under section 350 of the Tariff Act of 1930, as amended.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the period during which the President is authorized to enter into foreign-trade extension agreements under section 350 of the Tariff Act of 1930, as amended and extended (19 U. S. C. sec. 1351), is hereby extended for a further 67 Stat. 472, period of one year from June 12, 1954.

Sec. 2. No action shall be taken pursuant to such section 350 to decrease the duty on any article if the President finds that such reduction would threaten domestic production needed for projected national defense requirements.

Sec. 3. The enactment of this Act shall not be construed to determine or indicate the approval or disapproval by the Congress of the Executive agreement known as the General Agreement on Tariffs and 61 Stat. pts. 5 and 6.

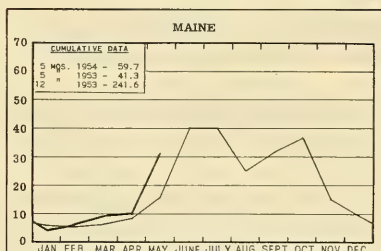
Approved July 1, 1954.



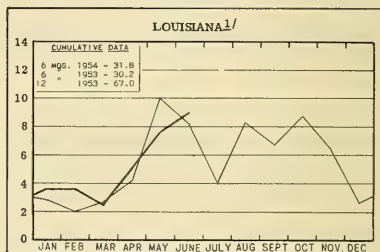
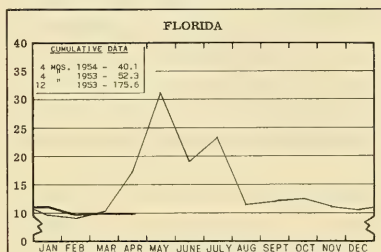
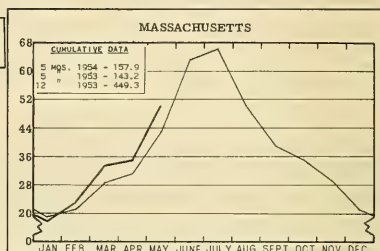


## CHART 1 - FISHERY LANDINGS for SELECTED STATES

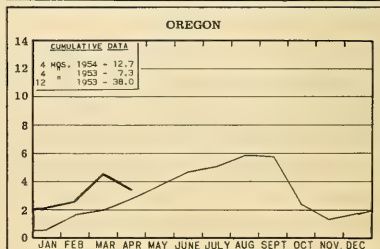
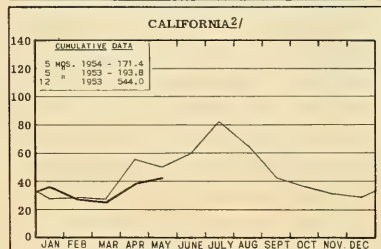
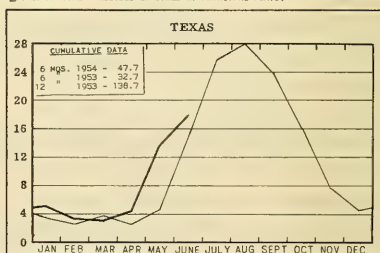
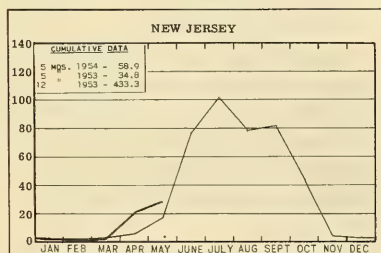
In Millions of Pounds



Legend:  
— 1954  
--- 1953



<sup>1/</sup>ONLY PARTIAL--INCLUDES LANDINGS AT PRINCIPAL PORTS.

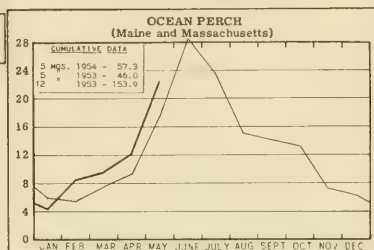
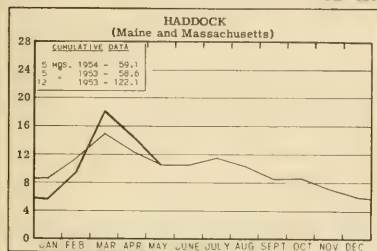


<sup>2/</sup>ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

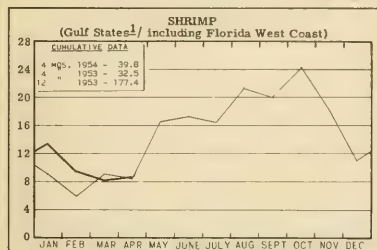


# CHART 2 - LANDINGS for SELECTED FISHERIES

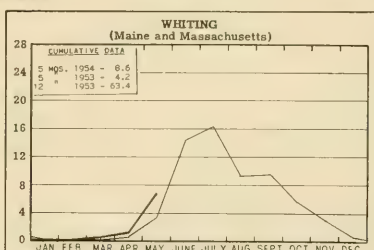
In Millions of Pounds



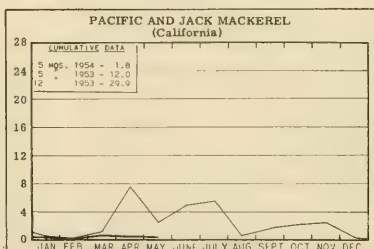
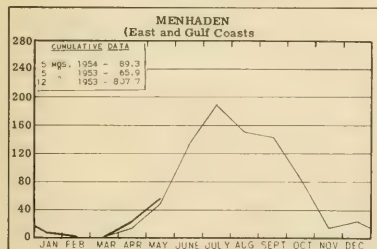
In Millions of Pounds



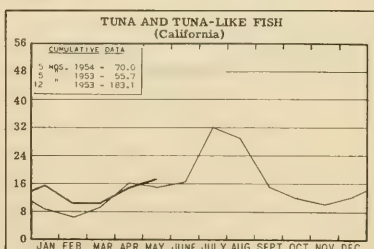
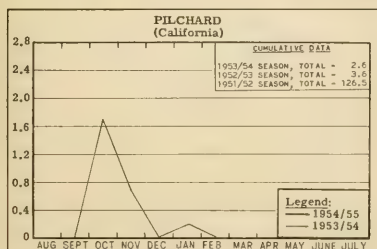
<sup>1</sup>/LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.



In Thousands of Tons

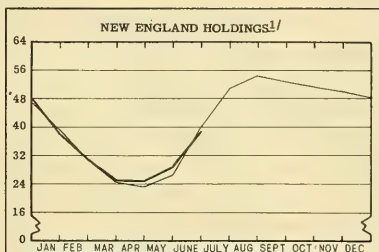
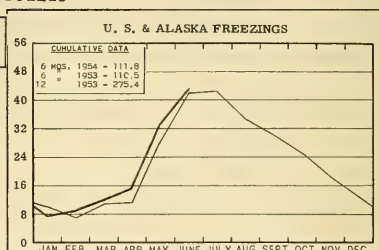
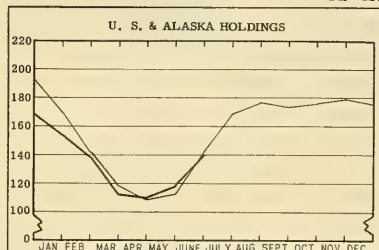


In Thousands of Tons

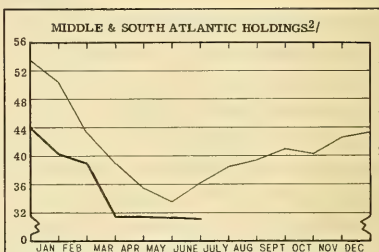


# CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS \*

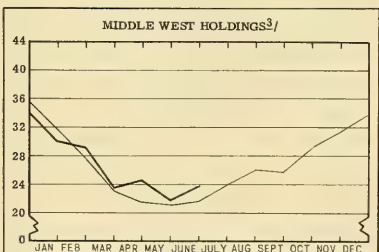
In Millions of Pounds



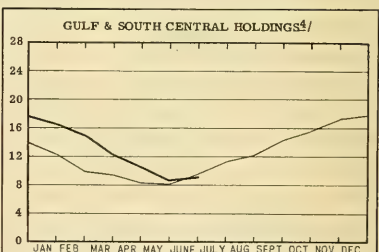
<sup>1/</sup>MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.



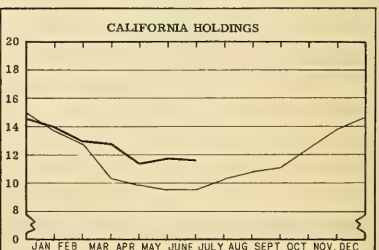
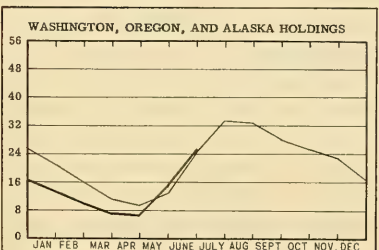
<sup>2/</sup>ALL EAST COAST STATES FROM N.Y. SOUTH.



<sup>3/</sup>OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR., & KANS.



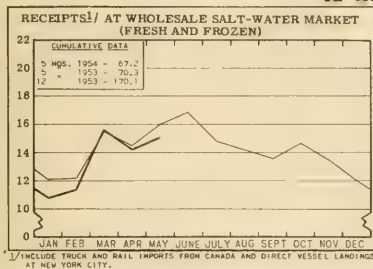
<sup>4/</sup>ALA., MISS., LA., TEX., ARK., KY., & TENN.



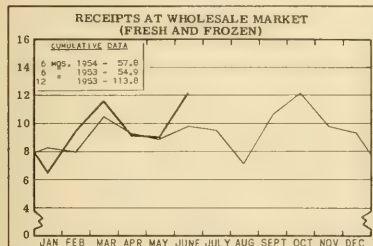
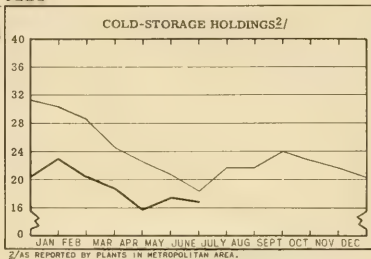
\*Excludes salted, cured, and smoked products.

# CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

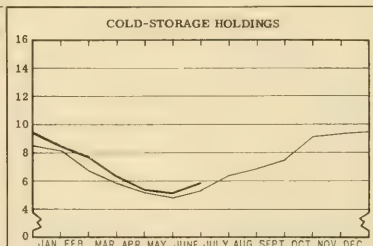
In Millions of Pound



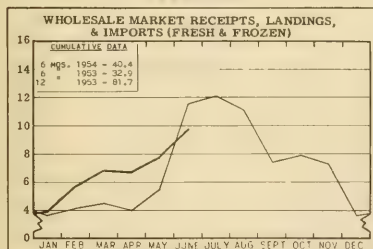
**NEW YORK CITY**



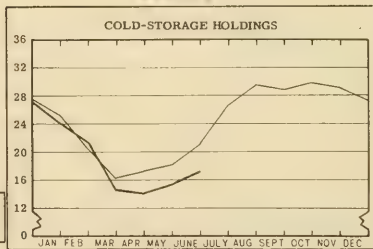
**CHICAGO**



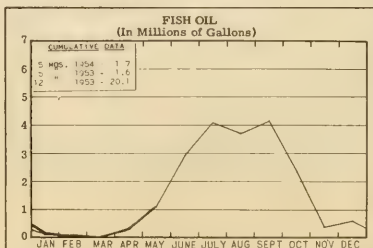
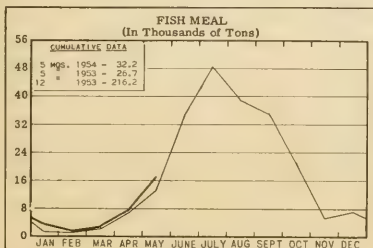
**SEATTLE**



**BOSTON**



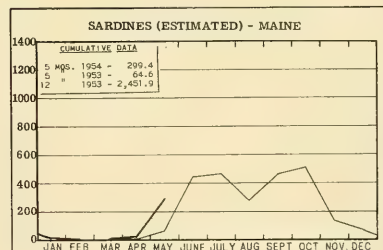
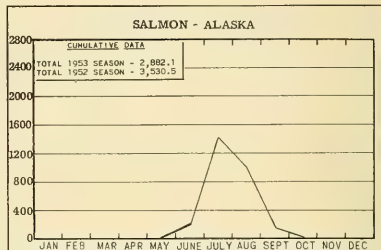
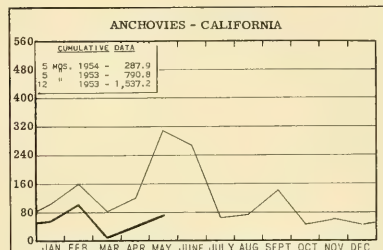
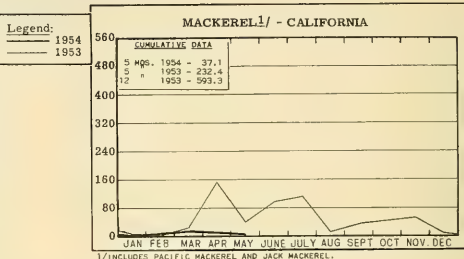
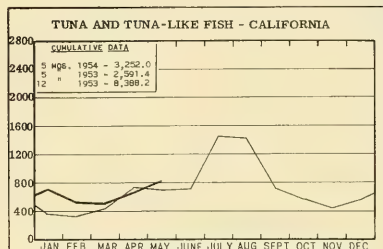
## CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA





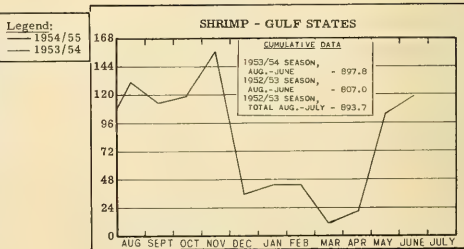
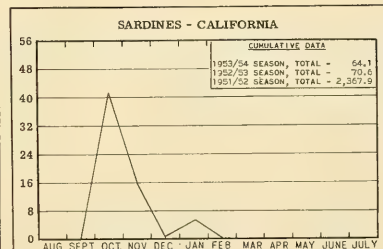
# CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

In Thousands of Standard Cases



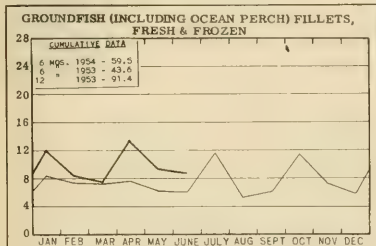
**STANDARD CASES**

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES .....	100	$\frac{1}{4}$ drawn	$3\frac{1}{2}$ oz.
SHRIMP .....	48	--	5 oz.
TUNA .....	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS .....	48	No. 1 oval	15 oz.
SALMON .....	48	1-pound tall	18 oz.
ANCHOVIES .....	48	$\frac{1}{2}$ lb.	8 oz.

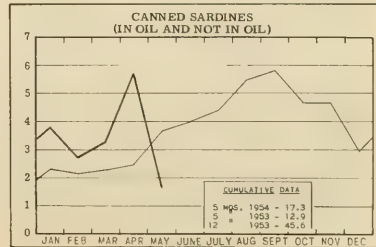
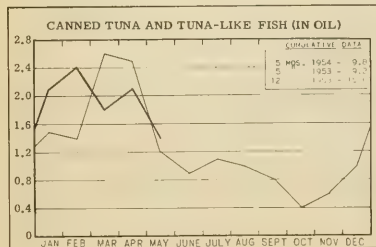
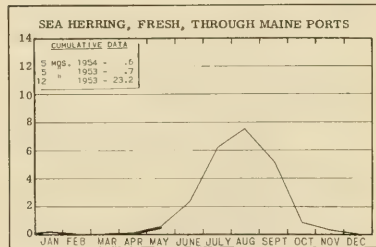
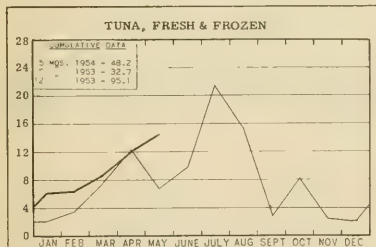
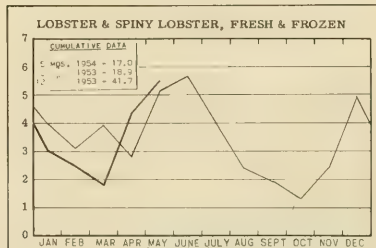
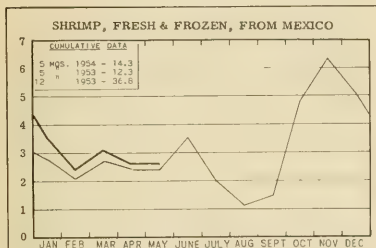
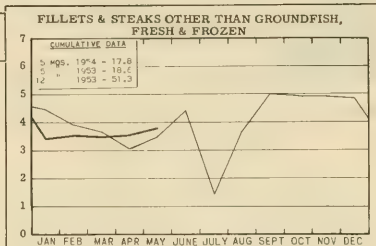


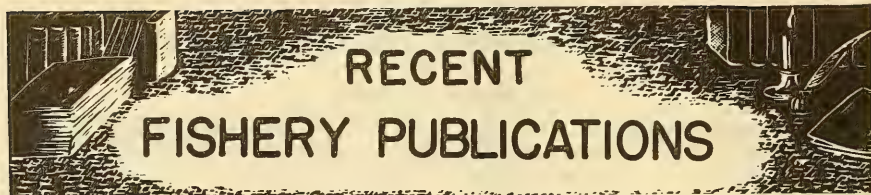
## CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds



Legend:  
 — 1954  
 - - 1953





## FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA  
FL - FISHERY LEAFLETS.  
SSR-FISH - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).  
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number   | Title  |
|----------|--|
| CFS- 978 | - Florida Landings, January 1954, 6 pp.  |
| CFS- 995 | - Maine Landings, April 1954, 3 pp.  |
| CFS- 996 | - Massachusetts Landings, April 1954, 8 pp.  |
| CFS- 998 | - Mississippi Landings, April 1954, 2 pp.  |
| CFS-1000 | - Fish Meal and Oil, April 1954, 2 pp.   |
| CFS-1001 | - Texas Landings, April 1954, 3 pp.  |
| CFS-1003 | - Imports & Exports of Fishery Products, 1949-1953, 8 pp.  |
| CFS-1005 | - Gulf Fisheries, 1952, Annual Summary, 10 pp.   |
| CFS-1015 | - Alabama Landings, April 1954, 2 pp.  |
| FL - 97  | - Fish Culture as a Livelihood (revised), 3 pp.  |
| FL - 254 | - List of Fishery Associations in the United States, Alaska and Hawaii (revised), 13 pp.                       |
| FL - 293 | - List of Fishermen's and Fish Shore Workers' Unions in the United States, Alaska, and Hawaii (revised), 8 pp. |
| FL - 416 | - Little Tuna Recipes, 6 pp.   |

Sep. No. 373 - Freezing Gulf-of-Mexico Shrimp at Sea.

Sep. No. 374 - Gulf-of-Maine Bluefin Tuna Exportation--1953.

SSR-Fish, No. 121 - Angling on Little Pigeon River, Great Smoky Mountains National Park, 1953, by Robert E. L. Lennon, 30 pp., processed, April 1954.

Survey of Sport Fishery Projects, 1954, Circular 26, 149 pp., processed, April 1954. This circular is the second annual catalog of sport-fishery programs in the United States. Its objective is to provide fishery administrators, teachers, research workers, and managers a means of keeping abreast of current work in fish conservation and restoration activities.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

Alaska Fishery and Fur-Seal Industries, 1951, by Seton H. Thompson, Statistical Digest No. 31, 73 pp., illus., printed, 35 cents, 1954. This report was compiled by the field staff of the Branch of Alaska Fisheries and from statistical returns submitted by all fishery operators in Alaska. The statistical material was assembled and tabulated by the Statistical Unit of the Branch of Commercial Fisheries, using for the first time automatic equipment to analyze the fish tickets, vessel registrations, and sworn production reports. Detailed reports and statistical tables concerning the operation and yield of the various fishery industries are presented, with added data on certain related matters, particularly the condition of the fishery resources. Under the section on fishery industries, the following subjects are covered: court decisions; Alaska Department of Fisheries; research; exploratory fishing investigations; administration; management; and general statistics on salmon, herring, halibut, shellfish, and miscellaneous fishery products. The second section on the Pribilof Islands fur-seal industry covers administration, fur-seal population studies, and general statistics on the fur seals taken in 1951. A statement is also included on sealing privileges accorded aborigines.

Laws and Regulations for Protection of the Commercial Fisheries of Alaska, 1954, Regulatory Announcement 42, 60 pp., printed, March 1954, 20 cents.

## MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

Age and Growth Study of Tillamook Bay Chum Salmon (ONCORHYNCHUS KETA), by Kenneth A. Henry, Contribution No. 19, 28 pp., illus., printed, Fish Commission of Oregon, March 1954. Describes a study of some of the biological characteristics of Tillamook Bay chum salmon, methods of collecting data, age composition, sex ratio, growth as determined by scale analysis, and comparison with other areas.



THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATIONS ISSUING THEM.

Bulletin of the Japanese Society of Scientific Fisheries, vol. 19, no. 9, 1954, 66 pp., illus., printed in Japanese and summaries in English. The Japanese Society of Scientific Fisheries, Tokyo, Japan. Contains the following scientific papers: "The Metabolism of the Pearl Oyster, *Pinctada martensii*--I. On the Carbonic Anhydrase;" "Studies on Antisepsis of Fishing Cotton Yarns--I. Antiseptic Coating with Protein Sols;" "Studies on Antisepsis of Fishing Cotton Yarns--II. Antiseptic Treatment with Polyvinyl Latex as the Binder;" "Urea Content and Ammonia Formation of the Muscle of Cartilaginous Fishes--II;" "On the White Spots Appearing on the Surface of the Seasoned and Dehydrated Globe-fish, 'Hugu-Mirinboshi'--I;" "Model Experiments on a Sardine Ringnet;" "Studies on Preventing Oxidation of Fish Oils and Fish Products--I. Effects of Butylhydroxyanisole (B.H.A.) on Fish Oils;" "Experimental Studies on the Propagation of the Pearl Oyster, *Pinctada martensii*--II. On the Unusual High Mortality of Pearl Oyster Caused by Bacteria--I;" "Biochemical Studies on Pearl Oyster, *Pinctada martensii*--I. Distribution of Glucosulfatase, Phenolsulfatase and Chondrosulfatase in Various Tissues of Pearl Oyster;" "Studies on the Antibiotic Action of Fish Components--V. Influence of the Ingredients of the Medium on the Production of the Antibiotic Action;" and "Ecological Studies on a Clupeoid Fish, *Argentina semifasciata*."

Bulletin of the Japanese Society of Scientific Fisheries, vol. 19, no. 10, 1954, 78 pp., illus., printed in Japanese and summaries in English. The Japanese Society of Scientific Fisheries, Tokyo, Japan. Contains the following scientific papers: "Animal Protein Factor (APF) and Vitamin B<sub>12</sub> in Marine Products--III. Seaweeds (Part 2) and Others;" "Animal Protein Factor (APF) and Vitamin B<sub>12</sub> in Marine Products--IV. Variations in the Vitamin B<sub>12</sub> Content During Spoilage of Marine Animals;" "On a Method of the Determination of Oxygen Consumption of Fish--I;" "Studies on a Kind of Discoloration of Fish--Oil--VI;" "Urea Content and Ammonia Formation of the Muscle of Cartilaginous Fishes--III. The Distribution of Urea and Trimethylamine Oxide in Different Parts of the Body;" "On the Antennule Flagella of the Japanese Spiny Lobster, *Panulirus japonicus* (v. Siebold), as an Age-Determinant;" "Distribution of Catches of Tuna Long-line--IV;" "Studies on Fish Curing--III. On the Smoking Conditions Affecting the Quantity of Deprived Formaldehyde;" "Studies on Tagging Experiments with Fish;" "Studies on the Whale Oil--IX. Fatty Acids Composition of the Pacific Beaked Whale (*Berardius bairdii*) Oil (Part 3). On the Viscera Oil;" "How do Fish Select Positions and Kinds of Bags When Entering Into 'Masu-Ami'?"--II. Field Tests with the Sea Bass, *Lateolabrax japonicus* and Several Other Species;" and "Vitamin in Fish Meat--I. Variation in the Vitamin A Content in Fish Meat by the Anatomical Locality."

(Canada) Journal of the Fisheries Research Board of Canada, vol. XI, no. 3, illus., printed, May

1954. Fisheries Research Board of Canada, Ottawa, Canada. Contains, among others, the following articles: "A Comparative Study of the Yellow-tail Flounder from Three Atlantic Fishing Areas," by D. M. Scott; "Tagging Returns, Age Studies and Fluctuations in Abundance of Lake Winnipeg Whitefish, 1931-1951," by W. A. Kennedy; "Some Aspects of Olfactory Perception in Migrating Adult Coho and Spring Salmon," by J. R. Brett and D. MacKinnon; and "The Rockfish *Sebastes rubrivinctus* in British Columbia Waters," by K. S. Ketchen.

Control of Eel-Grass in Oyster Culture Areas, by A. R. A. Taylor, General Series No. 23, 3 pp., illus., printed. Fisheries Research Board of Canada, Atlantic Biological Station, St. Andrews, N.B., February 1954. A dense growth of eel grass (*Zostera marina* L.) interferes with oyster culture in the shallow areas of warm summer water in the Maritime Provinces. This circular describes the mechanical removal of eel grass; control by covering with shell, gravel, or sand; and chemical eradication of eel grass. In studies made by the Fisheries Research Board of Canada, the methods of covering in various ways and chemical treatment were found to give extended control of eel grass. Cutting the plants is only a temporary measure since new leaves and branches will soon develop unless the growing points are killed.

Diseases of Fishes of the Western North Atlantic--I. Diseases of the Sea Herring (CLUPEA HARENGUS), by Carl Sindermann and Aaron Rosenfield, Research Bulletin No. 18, 23 pp., illus., printed. Department of Sea and Shore Fisheries, Augusta, Maine, February 1954.

"An Ecological Study of the Gulf of Mexico Fishes, in the Vicinity of Cedar Key, Florida," by George K. Reid, Jr., article, Bulletin of Marine Science of the Gulf and Caribbean, vol. 4, no. 1, 1954, 97 pp., illus., printed, Marine Laboratory, University of Miami, Coral Gables (University Branch) 46, Florida.

Fishery Statistics of the United States 1951, by A. W. Anderson and C. E. Peterson, Statistical Digest No. 30, 341 pp., illus., printed, \$1.50, 1954. Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C. (For sale by the Superintendent of Documents, Washington 25, D. C.) This sourcebook, the latest in a series of annual statistical reports on the fisheries of the United States, Alaska, and Hawaii, contains data on the catch and ex-vessel value of fishery products; employment of persons, gear, and fishing craft in the fisheries; the production and value of manufactured fishery products; and related information. Surveys to obtain data on the commercial catch of fish and shellfish for the year 1951 were conducted in 1952 in all areas of the United States and Alaska except the Mississippi River and its Tributaries. The total catch of fishery products totaled 4,414,045,000 pounds, valued at \$360,826,000 ex-vessel--a decrease of 10 percent in quantity as compared with 1950. Out-

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standing developments during the year were the record landings of shrimp, menhaden, ocean perch, and the marked increase in salmon production. However, these increases did not offset large declines in the catches of such major species as the California pilchard, Maine and Alaska herring, Pacific tuna, and jack mackerel.

The catch of menhaden off the Atlantic and Gulf States during 1951 broke all previous records--1,127,065,000 pounds, valued at almost 13 million dollars ex-vessel. The catch was far greater than that of any other species taken by United States and Alaska fishermen. The Atlantic Coast catch of ocean perch totaled a record 258,320,000 pounds. Shrimp production amounted to over 224 million pounds, valued at nearly 52 million dollars ex-vessel, likewise new records. The 1951 salmon catch in the Pacific Coast States and Alaska was up almost 46 million pounds over the previous year, due mainly to good runs of pink salmon in Southeastern Alaska and Puget Sound. The Pacific Coast pilchard catch amounted to nearly 329 million pounds valued at over 7 million dollars ex-vessel--a decrease of 54 percent in quantity and 40 percent in value as compared with the previous year. The mackerel catch on the Pacific Coast declined from over 133 million pounds in 1950 to less than 89 million pounds during 1951. Tuna production on the Pacific Coast amounted to nearly 316 million pounds as compared with 390 million pounds in 1950. The catch of sea herring on both coasts amounted to only 154 million pounds, compared with nearly 364 million pounds the previous year.

The pack of canned fishery products in the United States and Alaska in 1951 amounted to over 801 million pounds, valued at slightly more than 301 million dollars to the packers--a decrease of 17 percent in quantity and 9 percent in value as compared with 1950. These decreases resulted principally from smaller packs of tuna, California sardines (pilchards), and Maine sardines. The 1951 production of fishery byproducts in the United States and Alaska was valued at over 69 million dollars--9 percent less than in the previous year. Frozen fish production in 1951 was the largest in history, amounting to 326 million pounds.

San Pedro, California, in 1951 continued as the nation's leading fishing port, both as to quantity and value of landings. Receipts at this port totaled over 513 million pounds, valued at nearly 31 million dollars ex-vessel. Other leading ports with respect to quantity were Gloucester (Mass.) 260 million pounds; San Diego (Calif.) 174 million pounds; and Boston (Mass.) 171 million pounds. San Diego with landings valued at nearly 26 million dollars ex-vessel held second place with respect to value; followed by Boston, 14 million dollars; and Gloucester, 13 million dollars.

Fishery statistics of the United States and Alaska are compiled and published annually to make available information on both the economic and biological aspects of the domestic commercial fisheries. Data on the economic aspects

are necessary to persons engaged in the commercial fishery and to governmental agencies concerned with its regulation and protection. From the biological standpoint, these data are important to sound fishery management in providing detailed information on fluctuations in the commercial catch by species, locality, gear, and on the type of gear and craft operated. They assist conservation agencies in regulating the commercial fisheries so as to produce maximum yields without depletion.

--B. E. Finley

(FOA) Monthly Operations Report (Data as of February 28, 1954), 94 pp., illus., processed. Division of Statistics and Reports, Foreign Operations Administration, Washington 25, D. C. Describes the FOA program in Latin America.

"The Genera of Oysters and the Australian Species," by J. M. Thomson, article, Australian Journal of Marine and Freshwater Research, March 1954, vol. 5, no. 1, pp. 132-168, 11 plates, illus., printed. Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C. 2, Victoria. A review of the status and nomenclature of the Australian ostreids. Three genera are recognized, *Ostrea* Linnaeus, *Crassostrea* Sacco, and *Pycnodonte* Fischer de Waldheim. Ten native species of Australian oyster and one imported species are described in detail. Two keys to the species are provided, one based on shell characters and one based on the details of the soft anatomy.

"The Impact of Science in the Fishing Industry-II," by Daniel P. Norman, article, Monthly Review Federal Reserve Bank of Boston, vol. 36, no. 2 (February 1954), pp. 7-10, printed. Federal Reserve Bank of Boston, Boston, Mass. New England will be directly affected by innovations now being introduced in the fishing industry. New developments in the fields of textiles, chemistry, refrigeration, and mechanization and their importance for the New England fishing industry are discussed. (Also see Commercial Fisheries Review, June 1954, p. 76.)

The Inshore Scallop Fishery of the Maritime Provinces, by J. S. MacPhail, General Series No. 22, 4 pp., illus., printed. Fisheries Research Board of Canada, Atlantic Biological Station, St. Andrews, N.B., February 1954. The giant or sea scallop (*Placopecten magellanicus*), which is found along the northwest Atlantic coast from Newfoundland to Cape Hatteras, has become a commercially important species in recent years. In the Maritime Provinces active fisheries have developed in inshore areas in the Bay of Fundy, along the south shore of Nova Scotia, and in the Gulf of St. Lawrence. In the Digby area of the Bay of Fundy boats are built and rigged specifically for scallop fishing which is the principal source of income for many fishermen there. In other areas, where scallop fishing is of lesser importance, the types of boats and gear have been influenced by those used in the more profitable groundfish or lobster fisheries, although other factors including the type of bottom and

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depth of water are of some importance. This circular describes the Bay of Fundy scallop fishery, the type and design of boats used, gear, fishing operations, shucking procedure, and handling of the meats. Variations in gear and fishing methods are also discussed.

(Institute of Seaweed Research) Annual Report for 1953, 48 pp., illus., printed, Institute of Seaweed Research, Inveresk, Midlothian, 1954. The annual Director's report of progress at the Institute on the research and development of the seaweed of the British Isles includes the following principal developments.

Another of the repeated surveys to determine the seasonal and cyclical changes undergone by the Laminaria sp. (brown seaweed) sublittoral beds of the Coast of Northern Scotland and adjacent islands was completed. A few of the interesting observations may be cited here. For a specific area the peak of weed growth had been reached between June and August, with a trebling of density between winter and summer. Severe gales in September of one year resulted in the loss of 34 percent of the seaweed in one area and by the following May the bed had not recovered its former density. In one area studied the tidal deposit of seaweed in summer was mainly red seaweed; that for autumn was brown seaweed. Aerial surveys of the extent of seaweed beds in Scottish waters combined with samplings at various depths have enabled the workers to estimate the total quantity of Laminariaceae at 10 million metric tons. Of this amount 39 percent is said to be concentrated in areas covering only 14 percent of the total sublittoral zone from 0 to 10 fathoms along 38 percent of the 5,300-mile coastline of Scotland and the islands studied.

In the field of microbiology of seaweeds, studies reported included attempts to isolate and evaluate the micro-organisms causing the decomposition of stacked weed, the effects of low temperature (23° to 14° F.) on the keeping qualities, and the strains promoting active hydrolysis of seaweed constituents. Work was continuing on the suitability of seaweed and its constituents as a media for the growth of such micro-organisms as the yeasts.

Harvesting equipment developments were mainly on the perfection of a continuous grapnel or belt harvester from the pilot to vessel-operations scale of operations. Structural weaknesses have been observed and corrective designs worked out. Capacities for production reported under experimental test conditions varied from 0.7 to 7 tons per hour, with sea and weather conditions being an important contracting factor.

Suction-type harvesting equipment was studied in scale model in tank experiments to improve the entry to the cut plants into the suction inlet.

It is expected that the use of underwater photography of the harvesting operations will

expedite improvements in both equipment and technique. Studies of limiting weather conditions for use by naval architects in design of seaweed harvesting vessels are a part of the Institute's program.

Observations on process development studies were made to further the extraction of other algal chemicals than the alginic acid now in commercial production, such as L-Fucose and hydroxyethyl Laminaria. Drying of seaweed was tested using thermal, pressure, and plasmolysis methods. Tests of the loss in soluble matter from the cutting of the weed into small pieces for suction harvesting showed that, while bruising is undesirable, cutting is satisfactory.

The chemistry, properties, and extraction of the various seaweed chemicals have been further investigated. Applications to the medical, fertilizer, and soil-conditioning fields are under study as well as the uptake of fission products by seaweed.

Animal-feeding experiments are being conducted using ensiled seaweed and various species prepared as meals for inclusion in diets replacing standard ingredients. Results are quite variable and indeterminate so far. Sheep refused the ensiled weed. Growth response of rats indicates the several constituents of seaweed tested compared generally with starch as energy sources.

A list of the publications of staff members and collaborators totaling some 24 articles in print and 16 in press is included.

--Charles Butler

(International Pacific Salmon Fisheries Commission) Annual Report 1953, 37 pp., and map, illus., printed, International Pacific Salmon Fisheries Commission, New Westminster, Canada, 1954. A report of the Commission, an international agency appointed under a Convention between Canada and the United States for the protection, preservation, and extension of the sockeye salmon fisheries in the Fraser River system. Discussed in this report are the various activities of the Commission during 1953; the regulations, the United States fishery, the Canadian fishery, Indian catch statistics, escapement, the 1954 cycle, rehabilitation of barren areas, and general investigations. Includes a map showing distribution of sockeye spawning grounds in the Fraser River watershed.

Introduction to Trawling, by A. Hodson, 63 pp., illus., printed, Published by the author, 80 Spring Bank, Grimsby, England, 1953. This new edition of one of the standard reference books on trawling contains complete descriptive and illustrative material on the North Sea otter trawl. Six chapters include specifications and photographs describing the otter trawl, trawl accessories, running gear, procedure for working otter trawl, hauling, net making and net-mending. One of the most valuable items is a two-page detailed drawing of a North Sea trawl



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(Vigner Dahl type), showing otter door hook-up, Dan Lenos, bobbins, beckets, floats, floppa, cod line, etc. The difference between beam trawls and otter trawls is explained. The types and sizes of netting used in the various parts of the trawl are described, as are such accessory items as otter boards and back strops, ground ropes, tickler chains, bobbins (wood and iron), belly lines, head lines, beckets, bridles and pennant wires, and quarter ropes or chains. Complete procedure for shooting and hauling is given. The final chapter concerns net making and net mending and is amply illustrated with photographs of the various steps involved. Besides being of interest to those readers not familiar with this type of fishing gear, the book should prove to be a valuable reference manual for experienced fishermen, researchers, and students of fisheries.

--D. E. Powell

Investigations of Mortalities to Downstream Migrant

Salmon at Two Dams on the Elwha River, by Dale E. Schoeneman and Chas. O. Junge, Jr., Research Bulletin No. 3, 51 pp., illus., printed, State of Washington Department of Fisheries, Seattle 99, Wash., April 1954.

"Like to Be a Frog Farmer?" by B. Bruce Barnum, article, Reclamation Era, June 1953, vol. 39, no. 6, pp. 118-119, illus., printed, Bureau of Reclamation, U. S. Department of the Interior, Washington 25, D. C. A brief description of the successful operation of a frog farm near Orland, Calif. Describes the construction of frog-breeding ponds, characteristics of the frog, and its feeding habits.

The Live Bait Shrimp Fishery of the Northeast

Coast of Florida, by Donald P. de Sylva, Technical Series No. 11, 35 pp., illus., printed, Florida State Board of Conservation, Tallahassee, Florida, 1954. Describes an investigation, undertaken by the Marine Laboratory of the University of Miami for the Florida State Board of Conservation, to study biological and economic aspects of the live-bait shrimp fishery of the northeast coast of Florida. The sport fishery of the area depends to a large extent on live shrimp as bait. Three species of shrimp are included in the fishery. The relative importance of these varies with locality, as does the method of fishing. The complex life history of the white shrimp is outlined. It is emphasized that the female bait shrimp species does not carry its eggs attached to its body and that the small shrimp caught in the bait fishery with egg masses on the abdomen are a different species. Also, the bait shrimp do not spawn in the shallows, but offshore in deep water. The economic importance of this industry is shown by the shrimp sales in these areas from July 1952 to July 1953, which amounted to nearly \$700,000. It is estimated that about 1,300 people make their living solely from the shrimp industry from Oak Hill to Jacksonville Beach. Catches, prices, and other economic data pertaining to the industry are presented. Methods of holding and transporting live shrimp are described. Included in

this project were studies on the fishery methods and gear and the identification of shrimp and fishes caught. The two principal gears used are the push net and the dip net. In addition, cast nets and trawls are employed. Each of seven shrimp-producing areas on the northeast coast of Florida is considered in relation to the important species of shrimp it produces, the gear used, the catch composition, and the ecology of the area. The catch composition of push net catches is presented. Few fish of sports or economic importance are caught. The author believes that the push nets (and other gear) have little or no harmful effects on the shrimp or fish stocks or on the habitat, and that the law prohibiting the use of push nets was not justified on the basis of conservation or economics.

Manual of Recommended Practice for Sanitary Control of the Breeding and Freezing of Shellfish

31 pp., processed, U. S. Department of Health, Education, and Welfare, Public Health Service, Division of Sanitary Engineering Services of the Bureau of State Services, Washington, D. C., 1954. The U. S. Public Health Service has, at the request of state and local health authorities, exercised supervision over the sanitary quality of shellfish shipped in interstate commerce. As its part of this joint operation each shellfish-shipping State adopts laws and regulations, conducts surveys for compliance, and issues yearly numbered certificates to shellfish dealers who comply with the minimum sanitary standards. The Public Health Service, on its part, reviews the State control program and rates a representative number of the shellfish processing plants. States whose control programs are acceptable are endorsed. A periodic compilation of all shellfish shippers who have been certified by the recognized State shellfish-control authorities is released by the Public Health Service for the information and guidance of the consuming public.

The manual just released is used by the Public Health Service to outline the acceptable sanitary practices in the rating of shellfish-breeding plants. There are other manuals used as guides for other phases of shellfish shucking and packing operations. (Shellfish herein refers only to edible oysters, clams, and mussels.)

The sanitary requirements which a shellfish-breeding plant must meet, in order to be certified by a State for inclusion by the Public Health Service in the compilation of certified shellfish shippers, are described under four major categories: (1) plant and equipment requirements; (2) plant personnel; (3) plant operation; and (4) packaging, identification, and refrigeration of product.

Each of the principal components of the plant buildings and equipment used is listed as a subheading. The acceptable condition and type is set forth. The Public Health reason for the requirement is clearly given. Detailed specifications titled "Satisfactory Compliance" complete the discussion of each item. For example there is to be found the following under the subheading:

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"Screening. When flies are present, rooms used for breeding, frying, or packing of shellfish, and/or the washing of utensils, shall have all openings screened, unless other effective means are provided for preventing the entrance of flies.

"Public-Health Reason: Flies may contaminate the shellfish with disease organisms, thus nullifying the effectiveness of all other public-health safeguards.

"Satisfactory Compliance: This item will be satisfied when:

- (a) All openings are effectively screened whenever flies are present.
- (b) Other means provided to prevent the entrance of flies are effective.
- (c) Screen doors open outward and are self-closing.
- (d) No flies are present."

The plant personnel section deals with: prohibition of employment to persons having communicable disease; and responsible supervision for compliance with plant, personnel, and operational cleanliness.

The plant operation section stresses the source and condition of shellfish and breeding material; the storage and use of batter and breeding mixture; paper containers; the cleaning and bactericidal treatment for equipment; and special conditions for pre-frying equipment.

Section four deals in the same manner with acceptable packaging, labeling, and refrigeration procedures, equipment, and conditions. For example, under "Refrigeration of Breaded Shellfish" there is stipulated: (1) that at no time during processing may the temperature of the product exceed 50° F.; and (2) that the packaged product must be transported promptly to the freezing room; and (3) that a temperature of 0° F. or lower is to be maintained in the cold-storage room. Some of the "satisfactory compliance" items under this same subheading include: (1) breaded shellfish are packaged and placed in the freezing room within 45 minutes after breading; (2) each freezing and cold-storage compartment is fitted with at least an automatic temperature control, a properly located indicating thermometer, a chart-type recording thermometer so installed as to record accurately the ambient air temperature at the warmest parts of the compartment, and these charts retained for at least one year after use for reference if needed.

--Charles Butler

"Marine Bait-Worms--A Maritime Industry," by J. S. MacPhail, article, *Progress Reports of the Atlantic Coast Stations*, No. 58, April 1954, pp. 11-17, illus., printed in English and summary in French. Fisheries Research Board of Canada, Ottawa, Canada.

"Marine Electrical Fishing," by W. Dickson, arti-

cle, *World Fishing*, vol. 3, no. 4, April 1954, pp. 148-151, printed, illus. John Trundell (Publishers) Ltd., London, England. This article, written by a member of the Marine Laboratory, Torry, Aberdeen, presents a brief but interesting account of the experiments to date in electrical fishing for marine fishes. A description, with appropriate figures, of the nature of electrical fields in fresh and salt water is given, and the process by which fish are paralyzed or attracted to the anode (electro-taxis) is explained. Some background on electrical fishing research, especially since the war, is provided for the benefit of those not intimately familiar with the subject. The problems involved in marine electrical fishing are emphasized. It is pointed out that roughly 50 times as much power is required in salt water than in fresh water for the same physiological effect on the fish. This is due to the much greater conductivity of salt water and to the boundless expanse of the sea. In recent years the Germans have been foremost in the development of marine electrical fishing devices and techniques, including a tuna shocking device and an electrical fishing apparatus with two electrodes adaptable to such possible uses as trawling. Experiments are now under way in the United Kingdom on (1) laboratory tests on the reactions of fish to a range of electrical stimuli, and (2) small-scale electrical fishing in the sea. The author concludes by pointing out that despite many limitations and unsolved problems there is hope that electrical fishing apparatus may be developed for use as a marine-research tool and, in some cases, as commercial fishing gear. Much of the article is too technical to have a great deal of meaning to those untrained in electrical engineering, but the average reader who has an interest in fisheries research will find it of value as an up-to-date picture of the subject. A short bibliography is included.

--D. E. Powell

(Oregon) *Fish Commission Research Briefs*, vol. 5, no. 1, 38 pp., illus., printed. Fish Commission of Oregon, Portland 1, Oregon, March 1954. Contains the following reports on some of the current studies of the Commission: "Population Limits of the Silver Salmon Run in Tillamook Bay During the 1951 Fishing Season," by Raymond A. Willis; "The Toxicity of Zinc or Cadmium for Chinook Salmon," by Wallace F. Hublou, James W. Wood, and Ernest R. Jeffries; "The 1951 Alsea River Chinook Salmon Investigation," by Alfred R. Morgan and F. C. Cleaver; "The Length of Time That Silver Salmon Spent Before Death on the Spawning Grounds at Spring Creek, Wilson River, in 1951-52," by Raymond A. Willis; and "Third Progress Report on Spring Chinook Salmon Diet Experiments," by Ernest R. Jeffries, Thomas B. McKee, Russell O. Sinnhuber, Duncan K. Law, and T. C. Yu.

*Shellfish With Certificates*, 4 pp., printed, 5 cents each, \$1.50 per 100 copies. Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C. (Sold by Gov-

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ernment Printing Office, Washington, D. C.) This small 4-page pamphlet is primarily designed to show the consumer that certified shellfish are the ones to look for and buy. It will be useful for wholesalers to supply to retailers or enclose with packaged shellfish, or for retailers to distribute to their customers.

The Selective Action of Gillnets on Fraser River Sockeye Salmon, by Alvin E. Peterson, Bulletin V, 101 pp., printed, illus. International Pacific Salmon Fisheries Commission, New Westminster, B. C., Canada, 1954. As part of the Commission's rehabilitation program for Fraser River salmon, a study of the selective action of linen gill nets was undertaken in 1947 and 1948. Selectivity for size, age class, sex ratio, and numbers of sockeye salmon was determined, which indicated the selectivity of the commercial fishery at that time. Of the four types of fishing gear used on Fraser River sockeye (purse seines, gill nets, traps, and reef nets), United States fishermen use primarily purse seines and Canadian fishermen use mainly drift gill nets. The mesh size of the gill nets is not restricted, ranging from about  $5\frac{1}{4}$  to  $6\frac{1}{2}$  inches stretched mesh. The depth of the gill nets is limited to 60 meshes, and the length is restricted to 150 fathoms in the river above Garry Point and 200 fathoms below the Point outside the river. The gill net boats vary in length from about 26 to 38 feet, setting and hauling the gear from the stern roller. Experimental fishing from two chartered boats was carried out on the closed weekends during the 1947 and 1948 season using 10 different mesh sizes of gill netting ranging from  $5\frac{1}{4}$  to  $8\frac{1}{2}$ -inch mesh. A total of 6,521 sockeye were thus caught. Data on lengths, depths, widths, weights, sex, and scales were collected from these salmon. The nets were measured to determine exact mesh sizes and extent of shrinkage. The average shrinkage varied from 1/32 to 4/32 of an inch in the various meshes, practically the entire shrinkage occurring in the first three weekends of fishing. Results showed that the nets were highly selective for size, age group, and sex ratio of the salmon. The larger meshes caught mostly larger sockeye with males in the majority, while the smaller meshes caught mostly small fish with females predominating. There was an approximate linear relationship between mesh size and fish length. It was concluded that the indicated selectivity for the larger sizes of sockeye by the gill-net fleet from the 1946 and 1948 Chilko River population was apparently related to the mesh-size distribution fished by the fleet. The gill nets caught larger fish than those caught by nonselective purse seines. A test showed that, had the fleet mesh distribution on the 1948 Chilko run been similar to the mesh experiment, size selectivity would have been avoided. The percentage of males were found to be much lower in the escapements to the various Fraser River spawning grounds when fished by gill nets in the late run. When protected by early special closures of the gill-net fishery, escapements approximated a 1:1 sex ratio, but were unbalanced in favor of females about 1:2 when fished intensively by gill nets. The report

is illustrated with charts, graphs, and tables. A literature review of Fraser River gill-net selectivity is included.

--D. E. Powell

Some Observations on Extraction and Iodine Values of Fat from Fish Tissue, Press Cake and Meal, and on Peroxide Values of Meal Fat the First Day, by Pall Olafsson, 12 pp., illus., printed in Icelandic and English. (Reprinted from Timarit Verkfræðingafélags Íslands, vol. 38, no. 4), The Icelandic State Herringoil and Meal Factories, Siglufjörður, Iceland. Results are presented of a study of the spontaneous heating of fish meals. All fish meal investigated was found to heat spontaneously the first day after production. The rise of temperature in the center of 100-kilo jute bags was found to be  $5-40^{\circ}$  C. Extraction of fat from fish tissue, press cake, and meal is discussed. Beside extracting different quantities of fat from herring meal, the solvents were found to extract fat with variable contents of nitrogen. Nitrogen content of extracts was found to be 0.85-4.0 percent. Differences in iodine values of fat from press cakes and meals as determined by the Hanus method and the modified Rosenmund-Kühnemann method were found up to 25 units. Only slight differences were found in fat from fresh and deteriorated herring and rosefish. Peroxide values of meal fat were found to be highly variable. They were found to increase greatly on the first day after production from very low values in meal leaving the drier. Peroxide values of meal fat are also highly dependent upon to what extent the meal is dried. They increase rapidly when the meal is dried to below 10- to 12-percent moisture. Much higher values for peroxide content were found in fat from meal conveyed pneumatically than not conveyed. Meal was found to take up oxygen spontaneously on the first day.

Survey of Food and Nutrition Research in the United States of America 1952-53, 372 pp., processed, \$1.75. Prepared by the Food and Nutrition Board, National Research Council. Published by the U. S. Department of Agriculture, Washington, D. C., April 1954. (Sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.) The survey was carried out by the Food and Nutrition Board of the National Research Council and financed by a contract with the U. S. Department of Agriculture. It lists research projects which were active during part or all of the period between July 1, 1952 and June 30, 1953. The personnel associated with, and the organizations supporting and/or conducting, the reported research are given. Included is a section devoted to new problems and unsolved problems of long standing submitted by contributions to the survey who felt that these were of particular urgency in the food and nutrition fields. The data represents a survey of all organizations known to be active in food and nutrition research, including public and private educational institutions, State and Federal governmental departments and agencies, food experiment stations, the food industry, food trade organizations, and foundations making research grants-in-aid.



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The major headings of the Table of Contents lists: I. Research Projects; II. Titles for Suggested Research; III. Personnel Index; IV. Organization Index; V. Subject Index to Research Projects; VI. Appendix.

--F. T. Piskur

Technical Report of Fishing Boat No. 3, 234 pp., illus., printed in Japanese with 12 pp. of English abstract. Fishing Boat Laboratory, Production Division, Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan, July, 1952. This report contains 12 articles presenting results of the studies and investigations made in the Fishing Boat Laboratory during the 1951 fiscal year. In a brief introduction, Keigo Inamura, laboratory chief, explains that the function of the laboratory is to improve, through research, the economic position of the fishing industry, stimulate its development along sound lines, and increase the welfare of the fishermen who man the vessels. Fishing boat research was begun by the Fisheries Agency in fiscal 1948, and the present laboratory was established in the Production Division in 1950. The laboratory has four branches: General Affairs, Hull Study, Engine Study, and Nautical Surveying Instruments Study. A table briefly presents results of the various studies undertaken in the years 1948-52. The various articles deal with "Experimental Results on Actual Ships by No. 2 Type Torsionmeter;" "Study in Insulation of Fish Holds;" "On the Out-line of an Experimental Boat Compromising Japanese and Foreign Type;" "On the Trail Performances of the Japanese Type Experimental Boat Akatsuki;" "On the Characteristics of Water Proof Laminated Wood;" "Experimental Results of Ship Forms;" "Wearing of Cylinders of Fishing Boat Engines;" "Study on Magnetic Compass Bowl;" "An Example of Durability of Magnetic Compass Bowl;" "Catch Gauge for Two Boat Trawler;" "Experiments on Manufacturing of Remote Control Towing Thermometer for Mid Water;" and "Study on School Finder." Most of these experiments are of a continuing nature, but some valuable and interesting results have been obtained to date. It was found that the simplest and most effective method of preventing or reducing wearing of cylinders in engines of fishing vessels is by the application of chrome galvanization to the cylinders. An experimental catch gauge for two-boat trawlers was developed, after tank tests and practical experiments, to reveal the catch in the net during trawling operations, as well as mud or accidents to the net. Fairly good results were obtained with an experimental remote-control towing thermometer for giving immediate temperature readings at depths up to 70 meters. This instrument was developed mainly for the tuna fisheries and oceanographic observations.

--D. E. Powell

Technical Report of Fishing Boat No. 4, 173 pp., illus., printed in Japanese with brief English abstract. Fishing Boat Laboratory, Production Division, Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan, 1953. This report

presents, in 9 articles, the results of experiments and investigations carried out by the Fishing Boat Laboratory in 1952. Most of the articles report further on work which was discussed in the previous report (Technical Report of Fishing Boat No. 3). One new article describes the development of an improved "marine Aneroid barometer." On large ships, marine mercury barometers are used to check the Aneroid barometers, which are subject to various errors. But mercury barometers cannot be widely used on fishing vessels. Therefore, a marine Aneroid barometer was manufactured by the laboratory, successfully tested, and found to have the following characteristics: (1) high accuracy and sensibility; (2) negligibly small inclination error, temperature error, acceleration error, and friction error; (3) hardly an error caused by the lapse of time, and good reliability; and (4) need be very stable in vibration. It is predicted that this new marine Aneroid barometer may completely replace the marine mercury barometer. It may also be used on land for general meteorological observation.

--D. E. Powell

"Whaling on the Coast of British Columbia," by Gordon C. Pike, article, Norsk Hvalfangst-Tidende (The Norwegian Whaling Gazette), March 1954, no. 3, pp 117-127, illus., printed in Norwegian and English. Norsk Hvalfangst-Tidende, Sandefjord, Norway. A brief history of the British Columbia whaling industry. Also includes catch statistics, trends in the species composition of British Columbia catches, and processing methods. According to the author, "The future of the whaling industry on the coast of British Columbia is optimistic. In post-war years catches have shown a steady increase in numbers, and complete and efficient utilization of the raw material is being realized. Competition from vegetable oils and petroleum products, and high labor costs, are being compensated for by utilization of products other than the oil. The use of meat for animal food and possibly for human consumption gives promise of a successful future. With continued conscientious biological study in compliance with international whaling requirements it should be possible to recognize signs of depletion of any species should they occur, and to take steps to remedy the situation before serious damage is done."

#### Food and Agriculture Organization

The Food and Agriculture Organization has published reports describing that Agency's activities under the Expanded Technical Assistance Program for developing the fisheries of many countries. These reports have not been published on a sales basis, but have been processed only for limited distribution to governments, libraries, and universities. Food and Agriculture Organization, Viale delle Terme di Caracalla, Rome, Italy.

Report to the Government of Finland on the Possibilities for Fishery Development, FAO Report No. 72, 31 pp., and 5 plates of photographs, processed, January 1953. Describes the fish-

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eries of Finland; the administration and administrative problems of the Finnish fisheries; and recommendations for organization, management,

and research. Contains a bibliography of papers dealing with the Finnish fisheries.



### DEVILED CLAMS AN EXOTIC ENTREE

Clams in the shell are sold by the peck, dozen, or quart. Out of the shell, or shucked, they are sold by the pint or quart. They are also available frozen or canned.



Clams should be alive when purchased in the shell. If the shells hold tightly together, the clam is alive. If the shells are slightly parted, tap the clam gently and it will close tight if it is alive.

Clams are most frequently eaten raw, steamed, or in chowder, but many exotic main dishes use clams as the feature ingredient. The home economists of the U. S. Fish and Wildlife Service suggest "Deviled Clams." Served with tomato wedges, they are an attractive and appetizing entree.

#### DEVILED CLAMS

- |                                     |   |
|-------------------------------------|---|
| 1 pint clams                        | 1/4 teaspoon thyme                        |
| 1 clove garlic, minced              | 3 drops tabasco sauce                     |
| 2 tablespoons chopped onion         | 1 tablespoon chili sauce                  |
| 1/2 cup chopped celery              | 1 egg, beaten                             |
| 1/4 cup butter or other fat, melted | 1/2 cup cracker meal                      |
| 1 tablespoon flour                  | 2 tablespoons chopped parsley             |
| 3/4 teaspoon salt                   | 2 tablespoons butter or other fat, melted |
| 1/4 teaspoon pepper                 | 1/2 cup dry bread crumbs                  |

Drain and chop clams. Cook garlic, onion, and celery in butter until tender. Blend in flour and seasonings. Add clams and cook until thick, stirring constantly. Stir a little of the hot sauce into egg, add to remaining sauce, stirring constantly. Add meal and parsley. Fill 6 well-greased individual shells or casseroles. Combine butter and crumbs; sprinkle over top of each shell. Bake in a hot oven, 400° F., for 10 minutes or until brown. Serves 6.



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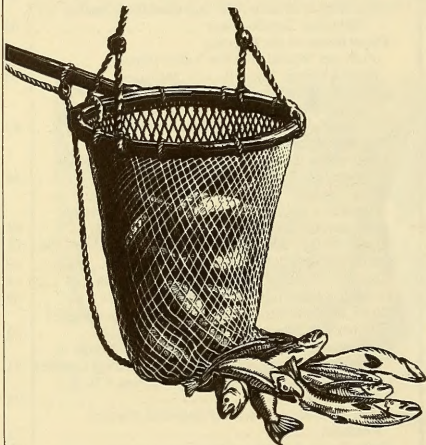
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## FRESH AND FROZEN FISH BUYING MANUAL

Fresh and Frozen Fish Buying Manual, Circular 20, is a manual intended to help food buyers and dietitians select the types of fish and shellfish likely to be available in their localities, within the limitations of their budgets and their menus. This manual is a revision of the Fresh and Frozen Fishery Products Reference Manual supplement to the August 1941 Fishery Market News.

### FRESH AND FROZEN FISH BUYING MANUAL



CIRCULAR 20  
FISH AND WILDLIFE SERVICE  
UNITED STATES DEPARTMENT OF THE INTERIOR

The forms in which fish and shellfish can be bought are described and illustrated in the manual. Seven different cuts for fish and four different market forms for shellfish are explained. Containers for fresh and frozen fish and shellfish are listed according to types and net weights.

The reader is informed on what to look for in the purchasing of whole and drawn fish, fillets and steaks, frozen fish, and the principal species of shellfish.

Under the heading "How Much To Buy," servings per person and per 100 persons are listed for fillets, steaks, fish sticks, dressed fish, and whole (or round) fish. Under the same heading, servings per 6 persons and per 100 persons are listed for the chief species of shellfish.

Other subjects covered are: handling, storing, cleaning, dressing, filleting, food value, edible portions, fish cookery, species names, producing areas, market sizes, fat-or-lean

categories, classifications and specifications (market and U. S. Government), and seasonal supply variations.

Copies of Fresh and Frozen Fish Buying Manual Circular 20 may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. The price is 25¢ per copy.